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Field Sampling Plan for Post-Record of Decision Monitoring for the Central Facilities Area Landfills I, II, and III Under Operable Unit 4-12

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Idaho National Engineering and Environmental Laboratory
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ABSTRACT

The purpose of this document is to direct the field sampling team in sampling efforts to support monitoring of the Operable Unit 4-12 Central Facilities Area Landfills I, II, and III and to describe the number and type of samples, sample location, and the sample analyses performed.

The monitoring activities are conducted pursuant to the requirements delineated in the *Record of Decision—Declarationfor Central Facilities Area Landjll I, II, and III (Operable Unit 4-12), and No Action Sites (Operable Unit 4-03)*. Part of the Record of Decision selected remedy included installation of a native soil cover over each landfill to mitigate infiltration of surface water and, consequently, to mitigate infiltration of potential contaminants to the groundwater. Environmental monitoring is designed to monitor and report on the remedy's effectiveness.

Information from this monitoring effort is used to evaluate the effectiveness of the landfill covers and to monitor for other potential contaminants that might be present in the groundwater from previous Central Facilities Area activities.

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ACRONYMS

CFA	Central Facilities Area
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
DMCS	Document Management Control System
DOE-ID	U.S. Department of Energy Idaho Operations Office
DQO	data quality objective
DR	decision rule
DS	decision statement
EPA	U.S. Environmental Protection Agency
FSP	Field Sampling Plan
FTL	field team leader
HASP	Health and Safety Plan
ID	identification
INEEL	Idaho National Engineering and Environmental Laboratory
MCP	management control procedure
NAT	neutron-access tube
PQL	practical quantitation limit
PSQ	principle study question
QA	quality assurance
QAPjP	Quality Assurance Project Plan
QA/QC	quality assurance/quality control
QC	quality control
SAP	Sampling and Analysis Plan
SRPA	Snake River Plain Aquifer
TDR	time-domain reflectometry

TPR	technical procedure
USGS	United States Geological Survey
VOC	volatile organic compound
WAG	waste area group
WGS	Waste Generator Services

Field Sampling Plan for Post-Record of Decision Monitoring for the Central Facilities Area Landfills I, II, and III Under Operable Unit 4-12

1. INTRODUCTION

1.1 Scope

The work described in this Field Sampling Plan (FSP) supports the monitoring and sampling efforts for Central Facilities Area (CFA) Landfills I, II, and III and associated areas, which are part of Operable Unit 4-12, Waste Area Group (WAG) 4 at the Idaho National Engineering and Environmental Laboratory (INEEL).

The monitoring and sampling activities are conducted pursuant to the requirements delineated in the *Record of Decision—Declaration for Central Facilities Area Landfill I, II, and III (Operable Unit 4-12), and No Action Sites (Operable Unit 4-03)* (Department of Energy Idaho Operations Office [DOE-ID] 1995). Part of the Record of Decision selected remedy included installation of a native soil cover over each landfill to mitigate infiltration of surface water and, consequently, to mitigate infiltration of potential contaminants to the groundwater. The environmental monitoring is designed to monitor and report on the remedy's effectiveness as well as monitor and sample for other potential contaminants that resulted from previous facility activities. In addition, the *Final Comprehensive Record of Decision for Central Facilities Area Operable Unit 4-13* (DOE-ID 2000) requires that nitrate concentrations continue to be monitored under this OU 4-12 monitoring plan because of elevated levels that have been experienced in wells downgradient from the CFA-08 Sewage Treatment Plant drainfield.

The Sampling and Analysis Plan (SAP) consists of two parts: (1) this FSP, and (2) the *Quality Assurance Project Plan for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10, and Inactive Sites* (DOE-ID 2002a). This FSP has been prepared in accordance with the appropriate INEEL management control procedures (MCPs) and the U.S. Environmental Protection Agency (EPA) guidance documents on the preparation of SAPs. This FSP describes the field activities that will occur. The Quality Assurance Project Plan (QAPjP) (DOE-ID 2002a) describes the processes and programs for ensuring that the data generated will be suitable for their intended use. Modifications to this FSP include revisions to the original FSP through various Document Action Requests as well as revisions and modifications that resulted from recommendations pertaining to sampling frequency, schedule, and long-term plans for the monitoring and sampling delineated in the *Central Facilities Area Landjlls I, II, and III Five-Year Review Supporting Documentation* (DOE-ID 2002b).

The purpose of this FSP is to guide the field team in the collection of environmental monitoring and sampling information, and results from the following:

- Monitoring moisture content in the soil by neutron-access tubes (NATs) adjacent to the landfills
- Monitoring moisture infiltration through the soil cover of the landfills using time-domain reflectometry (TDR) arrays
- Monitoring and sampling soil gas through a series of soil-gas sampling ports of varying depths adjacent to the landfills

- Monitoring and sampling groundwater from wells located near the CFA landfills and throughout the CFA.

The objectives of this monitoring are discussed in detail in the *Post Record of Decision Monitoring WorkPlanfor the Central Facilities Area Landjlls I, II, and II Operable Unit 4-12* (INEL 2003).

1.2 Background

The INEEL occupies 890 mi^2 of the northwestern portion of the Eastern Snake River Plain (see Figure 1-1) and is located 42 mi west of Idaho Falls, Idaho. Details regarding the INEEL's historical and geological information, as well as information relevant to the history, enforcement actions, and site characteristics of the CFA and the CFA landfills, is provided in the *Record of Decision—Declarationfor Central Facilities Area Landjlls I, II, and III (Operable Unit 4-12), and No Action Sites (Operable Unit 4-03)* (DOE-ID 1995).

1.3 Existing Data and Data Needs

1.3.1 Site Description and Characteristics of the Central Facilities Area

A physical description of the CFA landfills and landfill waste is provided in Section 1 of the *Remedial Design/Remedial Action WorkPlanfor Central Facilities Area Landjlls I, II, and III Native Soil Cover Project, Operable Unit 4-12* (DOE-ID 1996). The nature and extent of the contaminants of concern are summarized in the *Record of Decision—Declarationfor Central Facilities Area Landjlls I, II, and III (Operable Unit 4-12), and No Action Sites (Operable Unit 4-03)* (DOE-ID 1995). Greater detail concerning the site characteristics can be found in the *Remedial Investigation/Feasibility Studyfor Operable Unit 4-12: Central Facilities Area Landjll I, II, and III at the Idaho National Engineering Laboratory—Volume I: Remedial Investigation* (Keck et al. 1995) and the *Remedial Investigation/Feasibility Studyfor Operable Unit 4-12: Central Facilities Area Landjll I, II, and III at the Idaho National Engineering Laboratory—Volume II: Feasibility Study* (Dames & Moore 1995).

1.3.2 Identification of Data Needs

The data needs and monitoring objectives are discussed in the *Post Record of Decision Monitoring WorkPlanfor the Central Facilities Area Landjlls I, II, and III Operable Unit 4-12* (INEL 2003).

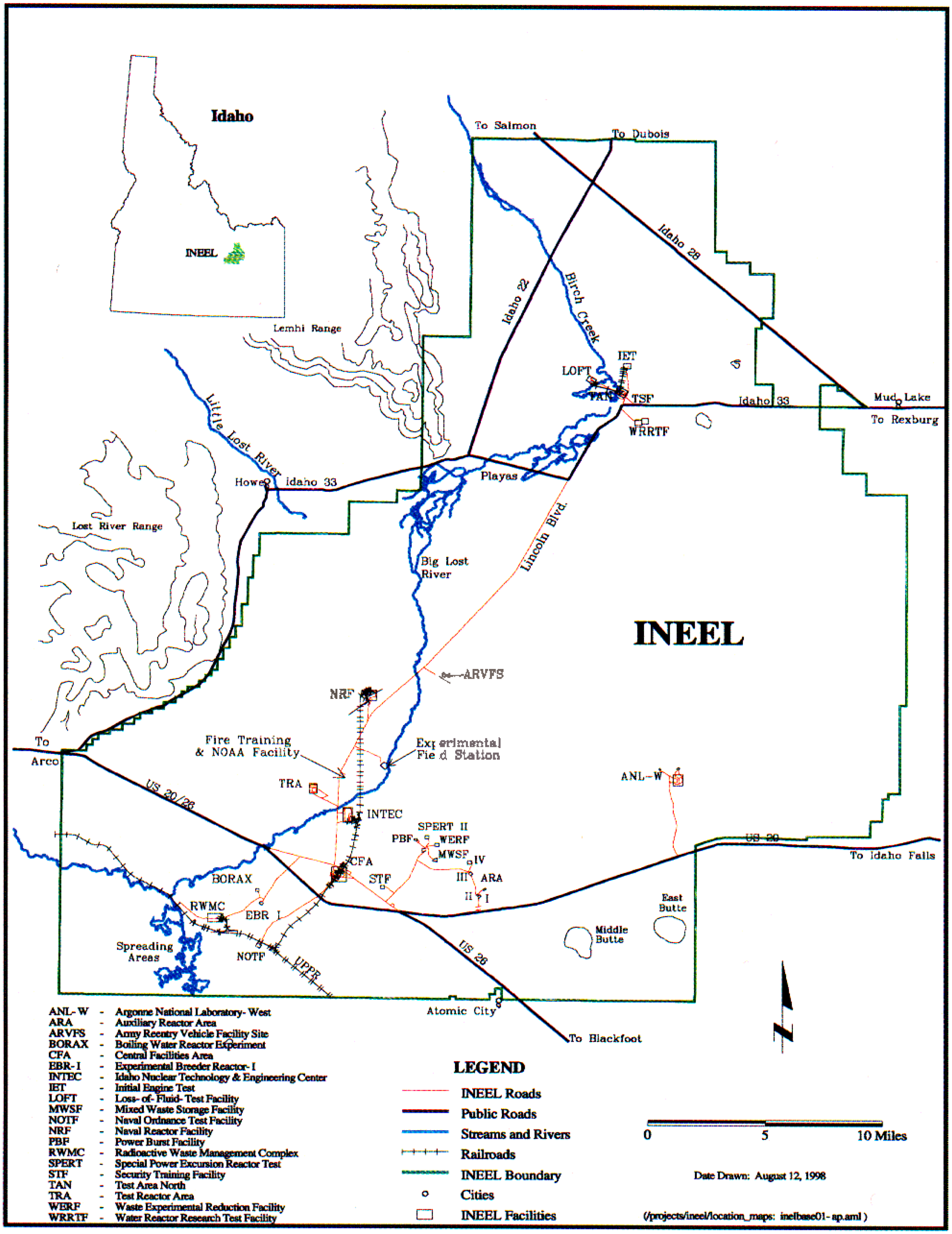

Figure 1-1. Map of the Idaho National Engineering and Environmental Laboratory.

2. DATANEEDS

This section identifies the data needs required for conducting the proposed sampling in support of the CFA landfill monitoring activities. Data needs and data quality objectives (DQOs) are defined in the following subsections.

Data needs have been determined through the evaluation of existing data and the projection of data requirements anticipated for analysis of samples and measurements collected in support of the CFA landfill monitoring effort. The DQOs have been developed following the process outlined in the *Guidancefor the Data Quality Objectives Process* (EPA 1994).

2.1 Problem Statement

The objective of DQO Step 1 is to use relevant information to clearly and concisely state the problem to be resolved. There is one basic concern with the landfills and that is whether the native soil covers are properly mitigating the infiltration of moisture through them. Moisture can infiltrate the landfill covers and, in doing so, can carry any contaminants that might be present to the Snake River Plain Aquifer (SWA) underlying the INEEL. Another concern as described in the *Central Facilities Area Landjll Five-Year Review Supporting Documentation* (DOE-ID 2002b) is that volatile organic compounds (VOCs) detected during soil gas monitoring appear to be increasing with time for some sample port depths. The problem statements associated with this DQO process step are described below:

- **Problem Statement 1—Moisture Infiltration Monitoring:** Reduce the uncertainties associated with whether moisture resulting from rainfall or spring run-off events is infiltrating the native soil covers at a rate that would raise concern that contaminants could be carried to the SWA.

- **Problem Statement 2—Vapor Contaminant Monitoring:** Ensure that the contaminant concentrations in the vadose zone do not increase to levels that will impact groundwater quality.

- **Problem Statement 3—Groundwater Contaminant Monitoring:** Detect contaminants that are leached from the CFA landfills into the groundwater.

2.2 Decision Identification

The goal of DQO Step 2 is to define the questions that the study will attempt to resolve and to identify the alternative actions that may be taken based on the outcome of the study. Alternative actions are those actions resulting from the resolution of the stated principal study questions (PSQs). The types of alternative actions considered depend on the answers to the PSQs. The PSQs and their corresponding alternative actions will then be joined to form decision statements (DSs). The PSQs, alternative actions, and resulting DSs for CFA landfill monitoring are provided in Table 2-1.

2.3 Identify Inputs to the Decision

The purpose of DQO Step *3* is to identify the type of data needed to resolve each DS identified in DQO Step 2. These data may already exist or may be derived from computational or surveying/sampling and analysis methods. Analytical performance requirements (e.g., practical quantitation limits [PQLs], precision, and accuracy) also are provided in this step for any new data that will be collected.

Table 2-1. Summary of Data Quality Objective Step 2 information.

PSQ #1—Are the CFA landfill covers properly mitigating the infiltration of moisture into the underlying waste?

Alternative Action	Error Associated with Incorrect Action	Conseauences of Error	Severity of Conseauences
The moisture content of the soil immediately underlying the CFA landfill covers is decreasing from historical (i.e., post cover installation) levels.	The integrity of the landfill covers is erroneously determined not to be intact.	Unnecessary maintenance of the landfill covers is performed with the expenditure of limited resources.	Moderate
The moisture content of the soil immediately underlying the CFA landfill covers is similar to historical (i.e., post cover installation) levels or increasing.	The integrity of the landfill covers is erroneously determined to be intact.	The potential exists for contaminant transport into the subsurface and ultimately to the SWA.	Low

DS #1—Determine whether the covers are mitigating the rate of moisture infiltration into the underlying waste.

PSQ #2—Are subsurface moisture levels indicative that moisture might have infiltrated the landfill waste and subsequently provided a transport mechanism for contamination?

Alternative Action	Error Associated with Incorrect Action	Consequences of Error	Severity of Consequences
The moisture content of the subsurface underlying the CFA landfills is decreasing from historical (i.e., post cover installation) levels.	The integrity of the landfill covers is erroneously determined not to be intact.	Unnecessary maintenance of the landfill covers is performed with the expenditure of limited resources.	Moderate
The moisture content of the subsurface underlying the CFA landfills is similar to historical (i.e., post cover installation) levels or increasing.	The integrity of the landfill covers is erroneously determined to be intact.	The potential exists for contaminant transport through the subsurface and ultimately to the SWA.	Low

DS #2—Determine whether subsurface moisture levels indicate the possible transport of contamination from the landfills.

Table 2-1. (continued).

PSQ #3—Are any contaminant trends apparent in the subsurface that would indicate the possibility that contamination is migrating into the aquifer from the landfills?			
Alternative Action	Error Associated with Incorrect Action	Conseauences of Error	Severity of Conseauences
Soil gas contaminant concentrations are determined to be similar to historical levels or decreasing.	The integrity of the landfill covers is erroneously determined to be intact.	Corrective actions are implemented with the expenditure of limited resources.	Moderate
Soil gas contaminant concentrations are determined to be increasing.	The integrity of the landfill covers is erroneously determined not to be intact.	Contaminant concentrations are increasing with the potential to adversely affect the SWA.	Low
DS #3—Determine whether the trend of contaminant concentrations in the subsurface indicates the possibility that contamination from the landfills is migrating toward the SWA.			
PSQ #4—Are any contaminant trends apparent in the SWA that would indicate the possibility that contamination is migrating into the aquifer from either the landfills or perhaps another unidentified source?			
Alternative Action	Error Associated with Incorrect Action	Conseauences of Error	Severity of Conseauences
Groundwater contaminant concentrations are determined to be similar to historical levels or decreasing.	The integrity of the landfill covers is erroneously determined not to be intact.	Corrective actions are implemented with the expenditure of limited resources.	High
Groundwater contaminant concentrations are increasing.	The integrity of the landfill covers is erroneously determined to be intact.	The SWA contaminant concentrations are increasing, thereby posing an unacceptable risk.	Moderate
DS #4—Determine whether the trend of contaminant concentrations in the SWA indicates the possibility that contamination from the landfills is adversely affecting the aquifer or if there is another unidentified source that might be contributing to contaminant concentrations in the aquifer.			
PSQ #5—If contaminants are present in the SWA underlying the CFA landfills, what are the possible sources of contamination?			
Alternative Action	Error Associated with Incorrect Action	Consequences of Error	Severity of Consequences
Groundwater elevations near the CFA landfills are defined, thereby enabling the creation of a correct model of contaminant flow.	The groundwater model determines a flow path that erroneously indicates that the CFA landfills are not the source of contamination.	No corrective actions for the CFA landfill covers are implemented.	High

Table 2-1. (continued).

Alternative Action	Error Associated with Incorrect Action	Consequences of Error	Severity of Consequences
Groundwater elevations near the CFA landfills are defined, leading to the creation of an incorrect model of contaminant flow.	The groundwater model determines a flow path that erroneously indicates that the CFA landfills are the source of contamination.	Corrective actions for the CFA landfill covers are implemented with the expenditure of limited resources.	Moderate
DS #5—Determine the direction of groundwater flow in order to identify possible sources of contamination should contaminants exceeding EPA groundwater quality standards or risk-based concentrations be detected in the SRPA.			

CFA = Central Facilities Area
DS = decision statement
EPA = U.S. Environmental Protection Agency
PSQ = principal study question
SRPA = Snake River Plain Aquifer

2.3.1 Information Required to Resolve Decision Statements

Table 2-2 specifies the information (data) required to resolve each DS identified in Section 2.2 and identifies whether these data already exist. For the data that are identified as existing, the source references for the data have been provided with a qualitative assessment as to whether the data are of sufficient quality to resolve the corresponding DS. The qualitative assessment of the existing data was based on the evaluation of the corresponding quality control (QC) data (e.g., spikes, duplicates, and blanks), detection limits, and data collection methods.

Table 2-2. Reauired information and reference sources.

DS #	Measurement Variable	Required Data	Do Data Exist?	Source Reference	Sufficient Quality?	Additional Information Required?
1	Landfill moisture levels	Field measurements of moisture levels	Yes	*Central Facilities Area Landjlls I, II, and III Five-Year Review Supporting Documentation* (DOE-ID 2002b)	Yes	Yes
2	Subsurface moisture levels	Field measurements of moisture levels	Yes	*Central Facilities Area Landjlls I, II, and III Five-Year Review Supporting Documentation* (DOE-ID 2002b)	Yes	Yes
3	Subsurface chemical concentrations	Laboratory measurements of potential contaminants	Yes	*Central Facilities Area Landjlls I, II, and III Five-Year Review Supporting Documentation* (DOE-ID 2002b)	Yes	Yes

Table 2-2. (continued).

DS #	Measurement Variable	Required Data	Do Data Exist?	Source Reference	Sufficient Quality?	Additional Information Required?
4	SWA chemical concentrations	Laboratory measurements of potential contaminants	Yes	*Central Facilities Area Landjlls I, II, and III Five-Year Review Supporting Documentation* (DOE-ID 2002b)	Yes	Yes
5	Groundwater elevations	Field measurements of groundwater levels	Yes	*Central Facilities Area Landjlls I, II, and III Five-Year Review Supporting Documentation* (DOE-ID 2002b)	Yes	Yes

DOE-ID = U.S. Department of Energy Idaho Operations Office
DS = decision statement
SRPA = Snake River Plain Aauifer

2.3.2 Basis for Setting the Action Level

The action level is the threshold value that provides the criterion for choosing between alternative actions. For DSs 1 and 2, moisture measurements will be collected to determine whether water is infiltrating the landfill covers or traveling to the subsurface where it would possibly provide a transport mechanism for contaminants. For DS 3, the potential contaminants include VOCs. For DS 4, the potential contaminants include VOCs, anions, and metals. For DS 5, groundwater elevation measurements will be collected to determine the SWA flow near the CFA landfills. For DS 4, the EPA drinking water standards provide the basis for setting the contaminants' action levels. The numerical values for the action levels are provided in DQO Step 5.

2.3.3 Computational and Survey/Analytical Methods

Table 2-3 identifies the DSs where existing data do not exist or are of insufficient quality to resolve the DSs. For these DSs, Table 2-3 presents computational and/or surveying/sampling methods that could be used to obtain the required data. For DSs 1 and 2, field moisture measurements will be made to determine the moisture content of the soil immediately underlying the landfill covers and the subsurface beneath the landfills. The data will be used to determine whether the infiltration rate is decreasing but will not provide an infiltration rate by which the landfill cover performance can be estimated as being adequate. For DS 3, analytical data will be collected to determine the concentrations of VOCs in the subsurface underlying the landfills. These data will be used to determine the statistical trend of contaminants to ascertain whether contaminants that could pose an unacceptable risk to the aquifer are being transported down through the subsurface. For DS 4, analytical data will be collected to determine the concentrations of contaminants in the SWA underlying the CFA landfills. As with the VOC data collected for DS 3, the groundwater data also will be used to determine whether a statistical trend exists. For DS 5, water elevations will be measured to evaluate groundwater elevation contours and flow direction.

Table 2-3. Information reauired for resolution of decision statements.

DS #	Measurement Variable	Required Data	Computational Methods	Survey/Analytical Methods
1	Moisture content	Moisture levels immediately underlying landfill covers	Compare moisture levels to historical data.	TDR arrays
2	Moisture content	Moisture levels in subsurface	Compare moisture levels to historical data.	NAT probes
3	Chemical	VOC concentrations in soil gas samples	Obtain statistical trend of VOC concentrations over time.	Analytical laboratory determination of VOC concentrations in soil gas samples
4	Chemical	Chemical concentrations in groundwater	Compare chemical concentrations to regulatory levels.	Analytical laboratory determination of chemical concentrations in groundwater
5	Water levels	Groundwater elevations	Flow direction over time	Field measurements of groundwater levels

DS = decision statement
NAT = neutron-access tube
TDR = time-domain reflectometry
VOC = volatile organic compound

2.3.4 Analytical Performance Requirements

Table 2-4 defines the analytical performance requirements for the data that need to be collected to resolve each DS. These performance requirements include PQL, precision, and accuracy requirements for each of the measurements and potential contaminants.

2.4 Study Boundaries

The primary objective of DQO Step 4 is to identify the population of interest, define the spatial and temporal boundaries that apply to each DS, define the scale of decision-making, and identify any practical constraints (hindrances or obstacles) that must be taken into consideration in the sampling design. Implementing this step ensures that the sampling design will result in the collection of data that accurately reflect the true condition of the site under investigation.

2.4.1 Geographic Boundaries

Limiting the geographic boundaries of the study area ensures that the investigation does not expand beyond the original scope of the task. This study will focus on the soil immediately beneath the CFA landfill covers, the subsurface underlying the CFA landfills, and the SWA beneath the CFA landfills and the immediate area surrounding the CFA landfills. Based on review of the hydraulic data and groundwater contour maps, the selected wells will allow the potential migration of groundwater contaminants to be evaluated. Because of the elevated nitrate concentrations experienced in the wells downgradient of the CFA-04 mercury pond, the geographic boundary includes those areas that may be influenced by nitrates migrating to the SWA from the pond.

Table 2-4. Analvtical performance reauirements.

DS #	Analyte List	Survey/Analytical Method	Preliminary Action Level	PQL	Precision Requirement	Accuracy Requirement
1	Moisture content	TDR array	Not applicable	1%	± 20%	80–120
2	Moisture content	NAT probes	Not applicable	1%	± 3%	97–103
3	VOCs	EPA TO-14	Not applicable	100 ppmv	± 25%	70–130
4	VOCs Alkalinity Anions (chloride, fluoride, sulfate) Metals Nitrate/nitrite (as nitrogen)	(a) (b) (c) CLP (d)	EPA and IDAPA regulatory levels	See QAPjP (DOE-ID 2002a)	± 20%	80–120
5	Groundwater elevations	Measuring tape	Not applicable	Not applicable	± 0.01 ft	Not applicable

a. SW-846 Method 8260B
b. EPA Method 310.1, EPA Method 310.2, or SM 2320B
c. EPA Method 300 or SW-846 Method 9056
d. EPA Method 353.1, EPA Method 353.2, or SM 4500
CLP = Contract Laboratory Program
DOE-ID = U.S. Department of Energy Idaho Operations Office
DS = decision statement
EPA = U.S. Environmental Protection Agency
IDAPA = Idaho Administrative Procedures Act
NAT = neutron-access tube
PQL = practical quantitation limit
QAPjP = Quality Assurance Project Plan
TDR = time-domain reflectometry
VOC = volatile organic compound

2.4.2 Temporal Boundaries

The temporal boundary refers to the timeframe to which each DS applies (e.g., number of years) and when (e.g., season, time of day, and weather conditions) the data should optimally be collected. Temporal boundaries are important when contaminant concentration changes over time are significant. For the TDR arrays, data are collected continuously; therefore, no temporal boundary applies. For the NAT probes, data will be collected more frequently during times of higher moisture infiltration (i.e., winter snow pack and spring run-off). For the remainder of the year, data will be collected monthly. For soil gas sample collection, sampling will occur in the early fall, because there is less moisture infiltration that can interfere with the soil gas concentrations. Groundwater sampling and analysis will be performed at approximately the same time of year (i.e., September/October timeframe) in an effort to alleviate any effect that changes in groundwater levels due to snowmelt and run-off might have on the data collected. Groundwater-level measurements also will be taken during this same time.

2.4.3 Scale of Decision-Making

The scale of decision-making is defined by joining the population of interest and the geographic and temporal boundaries of the area under investigation. For the CFA landfill monitoring, the scale of decision-making is the same as the geographic boundary defined in Section 2.4.1.

2.4.4 Practical Constraints

Practical constraints include physical barriers, difficult sample matrices, high radiation areas, or any other condition that will need to be taken into consideration in the design and scheduling of the sampling program. For the CFA landfill monitoring, there are no practical constraints to be considered.

2.5 Develop a Decision Rule

The purpose of DQO Step 5 initially is to define the statistical parameter of interest (i.e., mean, 95% upper confidence level) that will be used for comparison against the action level. Table 2-5 summarizes the decision rules (DRs) for the five DSs provided in Section 2.2. These DRs summarize the attributes that the decision-maker needs to know about the sample population and how this knowledge will guide the selection of a course of action to solve the problem. Data and statistical trends will be reviewed on an annual basis.

Table 2-5. Decision rules

DS#	DR#	Decision Rule
1	1	**If** the moisture content for soil immediately underlying the CFA landfill covers significantly exceeds that historically (i.e., post cover installation) experienced, **then** the source of the additional moisture will be investigated and the integrity of the covers will be verified. Otherwise, it will be concluded that the covers are functioning as designed.
2	2	**If** the moisture content in the subsurface underlying the CFA landfills significantly exceeds that historically (i.e., post cover installation) experienced, **then** the source of the additional moisture will be investigated and the integrity of the covers will be verified. Otherwise, it will be concluded that the covers are functioning as designed.
3	*3*	**If** the VOC concentrations in the subsurface indicate a significant statistical upward trend, **then** the integrity of the covers will be verified. Otherwise, it will be concluded that the covers are functioning as designed.
4	4	**If** the concentration of a contaminant in any well sample indicates a statistical upward trend, **then** the source of the contamination will be investigated and the integrity of the covers will be verified. Otherwise, it will be concluded that the covers are functioning as designed.
5	5	Not applicable

CFA = Central Facilities Area
DR = decision rule
DS = decision statement
VOC = volatile organic compound

2.6 Decision Error Limits

Because analytical data can only estimate the true condition of the site under investigation, decisions that are made based on measurement data could potentially be in error (i.e., decision error). For this reason, the primary objective of DQO Step 5 is to determine which DSs (if any) require a statistically based sample design. The purpose of determining the decision error limits is to specify the decision-maker's tolerable limits on decision errors, which are used to establish performance goals for the data collection design.

Tolerable error limits assist in the development of sampling designs to ensure that the spatial variability and sampling frequency are within specified limits. However, the sampling design for the CFA landfill monitoring is determined by the current locations of TDR arrays, NAT probe holes, soil gas-sampling vapor ports, and monitoring wells. The selection of these locations is based on professional judgment rather than statistics. Therefore, error limits are not used to determine sampling locations or frequency.

For those DSs to be resolved using a nonstatistical design (i.e., DSs 1, 2, and 5), there is no need to define the "gray region" or the tolerable limits on the decision error, since these only apply to statistical designs. While a statistical sampling design is not applicable to trend analysis as required for resolution of DSs *3* and 4, a level of significance needs to be established over which it can be determined whether a significant trend does exist. For the CFA landfill monitoring, a 95% significance level will be used to determine whether a trend in the data exists. Given the level of significance, the following null hypothesis was developed:

Null Hypothesis — A significant positive trend in the data exists.

2.7 Optimize the Design

The objective of DQO Step 7 is to present alternative data collection designs that meet the minimum data quality requirements, as specified in DQO Steps 1 through 6. Then, a selection process is used to identify the most resource-effective data collection design that satisfies all of the data quality requirements. For DSs 1 and 2, the sampling design has been implemented and no changes in that design are currently foreseen. The following subsections present the selected technology and sampling methods for resolving DSs *3* and 4 along with a summary of the proposed implementation design. The basis for the selected implementation design also is provided.

2.7.1 Soil Gas and Groundwater Monitoring

Monitoring will be performed from the soil gas vapor ports and groundwater monitoring wells on an annual basis. Samples will be sent to off-Site laboratories for analysis with full quality assurance/quality control (QA/QC) protocols. Field measurements will be used to determine groundwater elevations. Soil gas monitoring will be continued until the Agencies determine it is no longer necessary. Monitoring of the groundwater will continue to ensure compliance with the maximum contaminant levels (MCLs) until the nitrate levels in the groundwater are consistently below the MCL, and it is agreed upon with the Agencies during a 5-year review that the monitoring effort can cease.

2.7.2 Trend Analysis

The intent of the trend analysis is to determine whether the null hypothesis (a significant positive trend in the data exists) is true. Various statistical tests exist to determine whether a significant temporal trend exists in a given data set. Prior to any statistical treatment of the data, the data will be reviewed to verify whether the data set is parametric. If the data are determined to be parametric, then the simple linear regression described below will be used to test the null hypothesis. If the data are nonparametric, a different test (e.g., Mann-Kendall) will be used to determine whether a trend exists.

For simple linear regression, the statistical test of whether the slope is significantly different from zero is equivalent to testing if the correlation Coefficient is significantly different from zero. To perform the test, the correlation coefficient is first calculated (Equation 2-1). This correlation coefficient is then used to calculate the t-statistic (Equation 2-2), which is then compared to the critical value for $t_{1-\alpha/2}$ to determine whether there is a significant correlation between the two variables (in this case, an analyte's concentration versus time). Historical and current data sets will be combined to perform the trend analysis.

$$r = \frac{n\sum_{i=1}^{n} X_i Y_i - \sum_{i=1}^{n} X_i \sum_{i=1}^{n} Y_i}{\left(\left(n\sum_{i=1}^{n} X_i^2 - \left(\sum_{i=1}^{n} X_i\right)^2\right)\left(n\sum_{i=1}^{n} Y_i^2 - \left(\sum_{i=1}^{n} Y_i\right)^2\right)\right)^{1/2}} \tag{2-1}$$

where

r = correlation coefficient for a given analyte

X_i = the year of sample collection

Y_i = individual concentrations for a given analyte.

$$t = \frac{r\sqrt{N-2}}{\sqrt{1-r^2}} \tag{2-2}$$

where

t = the calculated t-test statistic

r = correlation coefficient for a given analyte calculated in Equation 2-1

n = the number of data points.

If the calculated t is greater than $t_{n-2, 1-\alpha}$ as obtained from a table of statistical t-values, then the null hypothesis is rejected and it can be concluded that there is no significant positive statistical trend in the data. Conversely, if the calculated t is less than $t_{n-2, 1-\alpha}$ as obtained from a table of statistical t-values, then the null hypothesis is not rejected and it can be concluded that there is a significant positive statistical trend in the data.

3. SAMPLING AND MONITORING LOCATION, FREQUENCY, AND MEDIA

The data from the CFA landfills and general CFA site monitoring and sampling will be collected using the following methods:

- Monitoring moisture content in the soil by neutron-probes adjacent to the landfills
- Monitoring moisture infiltration through the soil cover of the landfills using TDR arrays
- Monitoring and sampling soil gases through a series of soil gas sampling ports of varying depths adjacent to the landfills
- Monitoring and sampling groundwater from wells located near the CFA landfills and throughout the general CFA.

Additional details of each of the monitoring methods presented in the following subsections are included in the *Post Record of Decision Monitoring Work Plan for the Central Facilities Area Landjlls I, II, and III Operable Unit 4-12* (INEL 2003). Figure 3-1 is a map of the TDR arrays, neutron-probe access tubes, and soil gas sampling boreholes.

3.1 Neutron-Access Tube Monitoring

3.1.1 Data Collection Method for Neutron Access Tube Probe Monitoring

Before the start of each NAT probe logging, the latest neutron logs will be examined for evidence of standing water in the NATs. A water level e-line will then be lowered into the NAT to check for standing water. The water level e-line will be removed from the NAT before lowering the neutron probe into the NAT. If standing water is found in the NAT, the water level e-line will be decontaminated and the neutron probe will not be lowered into the standing water. If standing water is encountered, it will be removed either by bailing or using a peristaltic pump. The deepest probe reading will be made not less than 0.6 m (2 ft) above the water level. Should one of these probes be lowered into the water, electronic parts of the probe must be unscrewed and dried.

Readings will be taken from the NATs with the neutron probe in accordance with the instructions in Technical Procedure (TPR) -6563, "Neutron Probe Monitor Logging." Calibration of the neutron probe in accordance with resident procedures shall be verified before obtaining the readings. The process will be repeated at 0.3-m (1-ft) intervals in each NAT with all readings of 16-second duration. After logging the data from the NATs, the data will be downloaded to a portable computer. A portable, alternating current generator should power the neutron probe during the download to avoid a significant drain on the probe's batteries.

3.1.2 Monitoring and Reporting Frequency for Neutron-Access Tube Probe

Previously, monitoring of NAT probes was performed on a monthly basis, except during the late winter and early spring when the potential effects of snowmelt on the moisture infiltration in landfill areas need more frequent monitoring. Consequently, the NATs are monitored twice a month during the months of January, February, March, and April. During the remainder of the year, the NATs are monitored monthly.

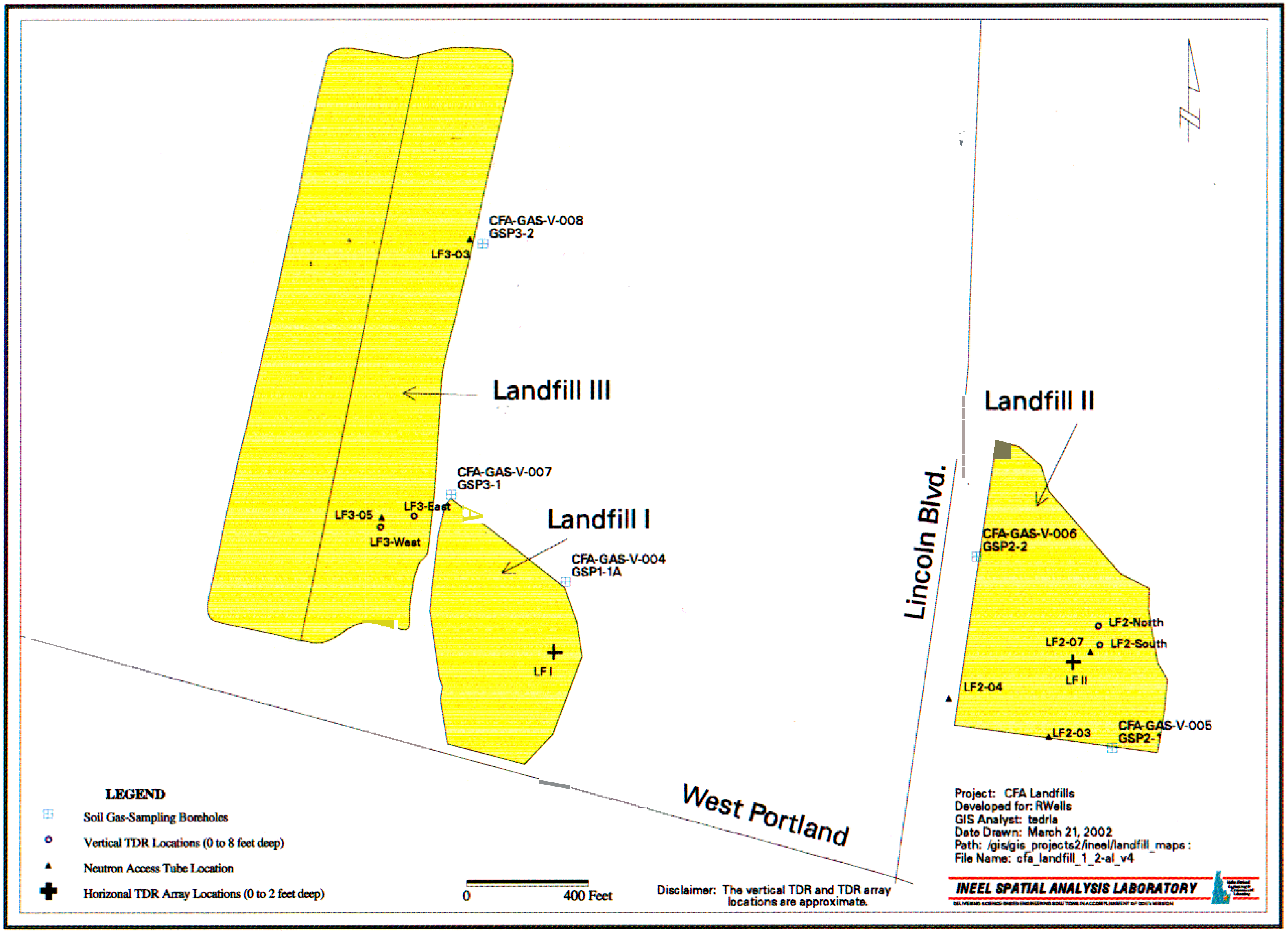

Figure 3-1. Map of time-domain reflectometry arrays, neutron-probe access tubes, and soil gas sampling boreholes.

3.2 Time-Domain Reflectometry Monitoring

3.2.1 Time-Domain Reflectometry Monitoring Data Collection

The readings, which are collected by the TDR monitoring equipment, are collected by cell phone connection to a computer in Idaho Falls. The data are then available for the operator to review, to enter the TDR array readings into the database plots, plot the data to observe trends of results, and prepare the data for inclusion into the annual monitoring reports for the landfills and the general CFA.

3.2.2 Time-Domain Reflectometry Monitoring and Reporting Frequency

The data from the TDR arrays will be downloaded and compiled monthly.

3.3 Soil Gas Monitoring

3.3.1 Soil Gas Sample Collection Method

Soil gas samples are collected into a Tedlar bag or SUMMA canister with a portable, battery-powered vacuum pump, as required by the appropriate TPR. The container will be prepared with a waterproof, adhesive label and will identify the sampling port from which the sample was collected. One or more coolers will be used to store and transport the soil-gas-vapor sample collection containers.

Before collecting a sample, the sampler will ensure that all sampling port valves are closed and that the apparatus is purged with in situ soil gas only. No nitrogen purge will be performed. Samples are then collected, packaged, and shipped to the laboratory for analysis. All five sampling locations are sampled on the same day. The soil-gas samples are analyzed for VOCs, including methane. Following sample collection, the sampler shall ensure that the monitoring ports are closed and sealed to prevent barometric pumping (sucking and blowing) of these sampling points between sampling events due to pressure changes from daily fluctuations and weather fronts.

Field control samples will be collected in a Tedlar bag or a SUMMA canister at the beginning and end of each day's field activities. The field control samples will be collected by drawing pre-purified nitrogen or filtered ambient air through the sampling apparatus with the sample probe attached. The field control samples will be labeled and analyzed in the same manner and for the same constituents as the actual soil gas samples. Analytical QC will be assessed using carrier gas blanks, standards, and duplicate analysis after every tenth sample taken. One field duplicate sample also will be collected for every 10 soil gas samples collected.

3.3.2 Soil Gas Sampling and Reporting Frequency

Recommendations made in the *Central Facilities Area Landjlls I, II, and III Five-Year Supporting Documentation* (DOE-ID 2002b) specify that soil gas samples should continue to be sampled on an annual basis. The report further recommends that the soil gas sampling should take place in the early fall (i.e., September), since there is less moisture infiltration that would interfere with the soil gas concentrations. Maximum soil gas vapor levels would be observed in the fall rather than during the winter months. Based on the *Central Facilities Area Landjlls I, II, and III Five-Year Supporting Documentation* (DOE-ID 2002b), soil gas sample collection and analysis for VOCs from the CFA landfills will continue until VOC concentrations demonstrate a significant and consistent downward trend in analytical results.

3.4 Groundwater Monitoring

3.4.1 Groundwater Monitoring Basis

As stated in Section 1.3.1, groundwater monitoring is conducted in order to (1) establish a baseline of potential contaminant concentrations in the aquifer against which future data could be compared, and (2) to ensure that drinking water standards are not exceeded in the SRPA due to migration of contaminants from the landfills. Groundwater samples will be collected from 11 wells near the CFA landfills. Table 3-1 lists the wells being sampled and the sampling rationale for each. In addition, groundwater-level measurements were obtained for the 11 wells being sampled for analysis and from 16 other wells located near the CFA landfills (see Figure 3-2). Table 3-2 provides a list of all wells requiring water-level elevation measurements. Figure 3-3 provides a graphical representation of the water level contours.

The groundwater samples will be analyzed for VOCs, metals' suite, anions, alkalinity, and nitrate/nitrite as nitrogen. Detectable analytes in the vapor also will be analyzed in the groundwater, including 2-chloroethylvinylether, acetonitrile, dichlorodifluoromethane (Freon-12), methane, and trichlorofluoromethane (Freon-11). These constituents will be reported as part of the VOC analysis. Details of the groundwater sample collection requirements and sample preservation are included in Table 3-3.

Table 3-1. Groundwater monitoring wells and rationale.

Well Identification	Well Completion (Depth Below Land Surface in meters and feet, respectively)	Sampling Rationale
LF 2-08	Screened, 148–151 (485–495)	Downgradient from Landfill II
LF 2-09	Screened, 143–151 (469.6–497)	Downgradient from Landfill II
LF 2-11	Screened, 148–152 (484-499)	Upgradient from Landfill II
LF 3-08	Screened, 152–155 (500–510)	Downgradient from Landfills I and III[a]
LF 3-09	Screened, 149–152 (490–500)	Downgradient from Landfills I and III[a]
LF3-10	Screened, 147–153 (481–501)	Adjacent to Landfill III
USGS-083	Open hole, 157-229 (516-752)	Further downgradient from CFA
USGS-128	Open hole, 139–187 (457–615)	Upgradient from Landfills I and III
CFA-MON-A-001	Screened, 149–158 (488–518)	Downgradient from CFA
CFA-MON-A-002	Screened, 149–158 (488–518)	Downgradient from CFA
CFA-MON-A-003	Screened, 149–158 (488–518)	Downgradient from CFA

a. These wells are crossgradient from parts of Landfill I and downgradient from other parts.

CFA = Central Facilities Area
USGS = United States Geological Survey

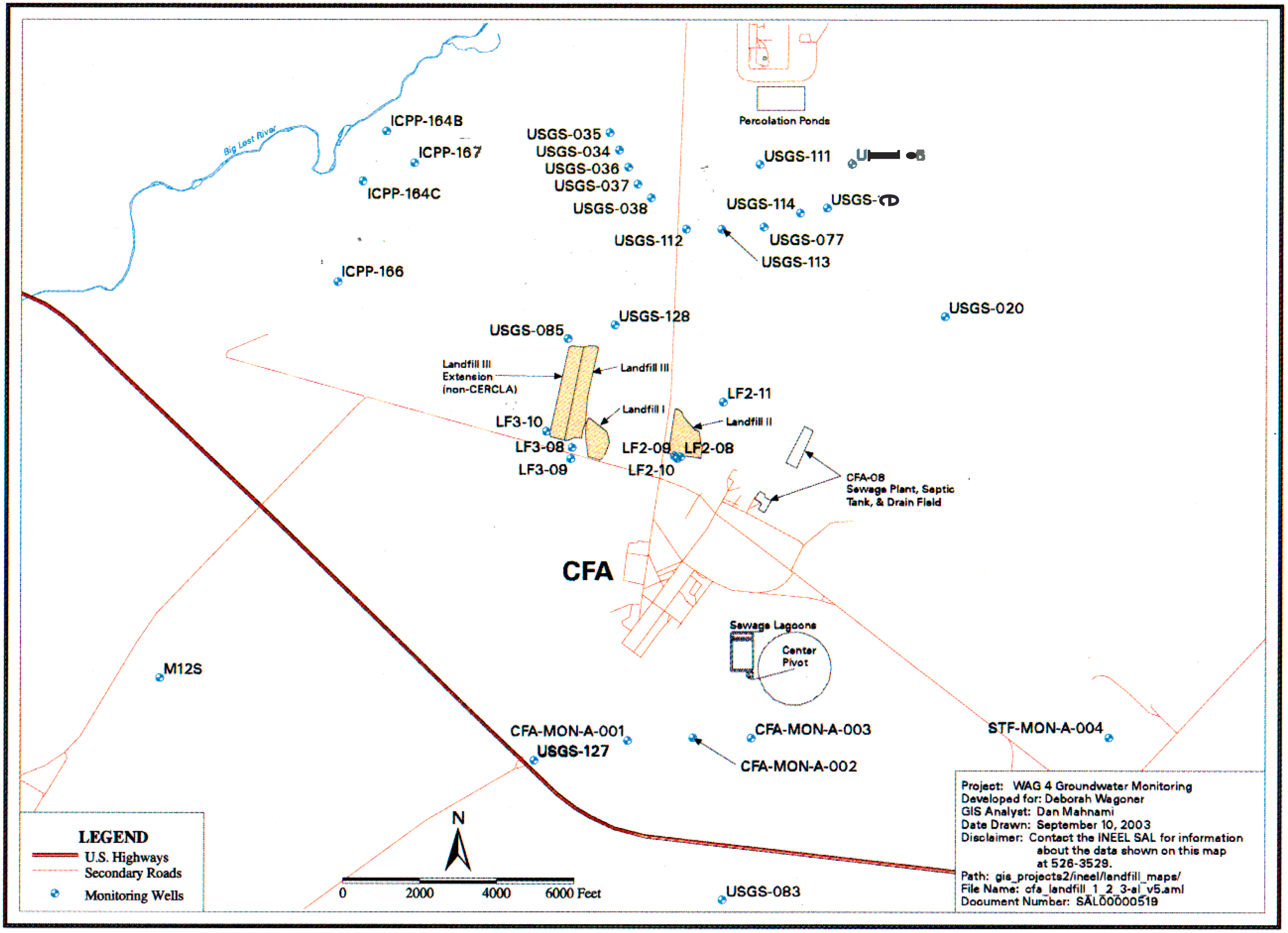

Figure 3-2. Map of the groundwater monitoring and measurement well locations.

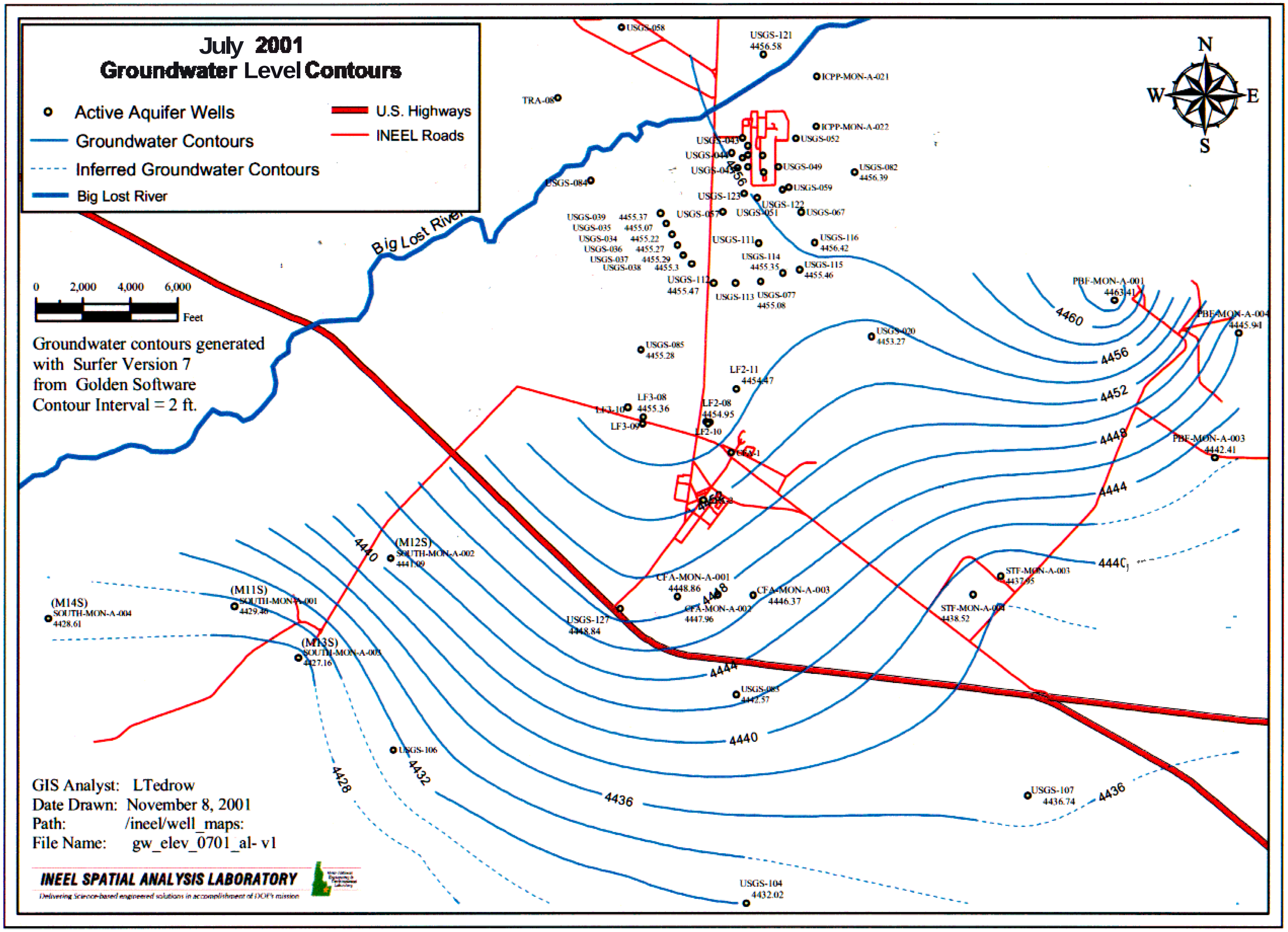

Figure 3-3. Regional water level contour plot.

Table 3-2. Water-level elevation measurement wells

Groundwater Monitoring + Water-Level Measurement Wells	Water-Level Measurement Only Wells	
LF 2-08	STF-MON-A-004	USGS-112
LF 2-09	LF2-10	USGS-113
LF 2-11	USGS-020	USGS-114
LF 3-08	USGS-034	USGS-115
LF 3-09	USGS-035	USGS-116
LF 3-10	USGS-036	USGS-127
CFA-MON-A-001	USGS-037	M12S
CFA-MON-A-002	USGS-038	ICPP-164B
CFA-MON-A-003	USGS-077	ICPP-164C
USGS-083	USGS-085	ICPP-166
USGS-128	USGS-111	ICPP-167

CFA = Central Facilities Area
USGS = United States Geological Survev

Table 3-3. Specific groundwater sample requirements for routine monitoring.

Analytical Parameter	Container Size	Container Type	Preservative	Holding Time”
Volatile organic analysis (SW-846-8260B)	40 mL	3 glass vials w/Teflon septa	4°C and H_2SO_4 to pH<2	14 days
Alkalinity	500 mL	1 x 500 mL (glass or plastic)	4°C	14 days
Anions (chloride, fluoride, and sulfate)	125 mL	1 x 125 mL (glass or plastic)	4°C	14 days
Total metals—unfiltered[b] Contract Laboratory Program list	1 L	Glass or plastic	pH<2, HNO_3	6 months, Hg 28 days
Nitrate/nitrite (as nitrogen) (Method 353.1, 353.2, or 353.3)	500 mL	Glass or plastic	H_2SO_4 to pH<2	14 days‘

a. Holding times are taken from date of collection, as referred to in Federal Register Vol. 49, No. 209, October 26, 1984.

b. Unfiltered samples will be collected unless there is an increasing trend of metals or increased indicators of turbidity.

c. Holding time is in accordance with *Methodsfor* Chemical Analysis *of* Water and Wastes, page xix (EPA 1983).

Groundwater sampling and analysis are conducted annually in September in order to consolidate various ongoing groundwater monitoring efforts at the INEEL and in keeping with the previously established norm for the CFA landfill monitoring. Groundwater samples are collected from wells downgradient from the former and current sewage treatment facilities (Wells CFA-MON-A-00l, CFA-MON-A-002, and CFA-MON-A-003), wells downgradient from Landfill II (Wells LF 2-08 and LF 2-09), one well upgradient from Landfill II (LF 2-11), wells located downgradient from Landfills I and III (Wells LF 3-08 and LF 3-09), one well adjacent to Landfill III (LF 3-10), one well located farther downgradient from the current sewage treatment facility (Well USGS-083), and one new well located upgradient from Landfills I and III (Well USGS-128). To note, while being downgradient from some parts of Landfill I, Wells LF 3-08 and LF 3-09 can also be considered crossgradient from other parts of Landfill I.

During the October 2001 sampling event, Well USGS-083 was added to the sampling event as an additional downgradient well for CFA. This well is located approximately 1,220 m (4,000 ft) farther downgradient from Wells CFA-MON-A-002 and CFA-MON-A-003. Well USGS-083 was proposed as an additional monitoring point for nitrate downgradient from the former and current sewage treatment plants. New Well USGS-128 was proposed for sampling during the October 2001 event to replace monitoring and sampling from Wells USGS-085 and USGS-112. However, Well USGS-128 was not completed in time for the groundwater sampling event; therefore, no well was sampled upgradient from Landfills I and III. Figure 3-2 shows the location of the wells.

3.4.2 Groundwater Sample Collection Equipment and Procedure

The groundwater monitoring wells, listed in Table 3-3, will be sampled for the analyses shown in the SAP tables located in Appendix A and in Table 3-4. When possible, for efficiencies of field sampling activities and potential cost savings, sampling will be coordinated and sampled cooperatively with United States Geological Survey (USGS) groundwater sampling personnel. All groundwater sampling will be completed using the equipment and procedures detailed in Guide (GDE) -140, “Decontaminating Sampling Equipment.”

3.4.2.1 Site Preparation. All required documentation and safety equipment will be assembled at the well sampling site, including radios, fire extinguishers, personal protective equipment, bottles, and accessories.

Before sampling, all sampling personnel are responsible for having read both the SAP and the corresponding Health and Safety Plan (HASP), which is the *Health and Safety Plan for the Environmental Restoration Long-Term Sitewide Groundwater Monitoring* (INEEL 2003). The field team leader (FTL) will perform a daily site briefing to discuss potential hazards and ensure that all personnel have the required training. The FTL will assign a team member to maintain document control and note this appointment in the WAG 10 groundwater sample logbook in accordance with the requirements of MCP-1194,” Logbook Practices for ER and D&D&D Projects.”

All sampling equipment that contacts the sample media will be cleaned in accordance with the requirements of MCP-1194. The exception to this will be dedicated, submersible sampling pumps. Sampling manifolds either will be decontaminated before bringing them to the field or decontaminated after use in each well before using them on another well.

3.4.2.2 Field Measurements. Initially, the field team will establish the work control zone as indicated in the pending HASP and will measure the depth to water. The water level data are used to determine the volume of water that must be purged before sampling. The field team will measure water levels at each well before purging, using an electronic measuring device. A postsampling water level measurement is not required. In addition to the water level measurement, the field team will measure the height from the depth-to-water measuring point to the top of the well casing and the stickup of the well casing, either above the ground surface or the well pad.

Table 3-4 shows the wells that will be sampled. This table supplies the field team with the necessary well completion data. The field team will calculate the purge volume based on the current water level and will record all calculations on the well purging data form. The FTL will supply the field team with the approximate past purge volume as a crosscheck.

Table 3-4. Specific sampling well information for the Central Facilities Area and landfills

Well Identification	Well Name	Screen Type and Screened Interval (depth below land surface in meters and feet, respectively)	Depth to Bottom (ft)	Pump Depth (ft)	Approximate Depth to Water (ft)
	CFA Sampled Wells				
196	LF 2-08	**SS** screen, 148–151 (485–495)	526	483	480
197	LF 2-09	**SS** screen, 143–151 (469–497)	676	486	485
199	LF 2-11	**SS** screen, 142–152 (466–499)	511	481	476
207	LF 3-08	**SS** screen, 152–155 (500–510)	526	480	493
726	LF 3-09	**SS** screen, 146–152 (480–500)	517	486	489
727	LF 3-10	**SS** screen, 147–153 (481–501)	530	494	491
1077	CFA-MON-A-001	**SS** screen, 149–158 (488–518)	547	514	491
1078	CFA-MON-A-002	**SS** screen, 149–158 (488–518)	526	516	487
1089	CFA-MON-A-003	**SS** screen, 150–156 (491–511)	515	508	—
532	USGS-083	Open hole, 157–229 (516–752)	752	606	501
1413	USGS-128	Open hole, 139–187 (457–615)	615	523	481

CFA = Cents-a1Facilities Area
USGS = United States Geological Survey

An inline flow meter may be attached to the sampling apparatus before purging to provide an accurate indicator of the pumping rate. If used, the portable inline flow meter will be attached downstream from the sampling port. The pre-purge flow meter reading will be recorded on the well purging data form so that the total volume purged can be recorded upon sample completion. If an inline flow meter is not used, then the purge-water flow volume will be measured using a measured bucket and a watch to measure the approximate flow rate. This will measure the amount of time it takes to fill a specific volume of the bucket (e.g., 1 or 5 gal).

4. SAMPLE IDENTIFICATION

A systematic 10-character sample identification (ID) code will be used to uniquely identify all samples. The uniqueness of the number is required for maintaining consistency and ensuring that no two samples are assigned the same ID code.

The first designator of the code, 4, refers to the sample originating from WAG 4. The second and third designators, **GW** or **SG,** refer to the sample being collected in support of either the groundwater or the soil gas monitoring. The next three numbers designate the sequential sample number for the project. A two-character set (i.e., 01, 02) will then be used to designate field duplicate samples. The last two characters refer to a particular analysis and bottle type. Refer to the SAP tables in Appendix A for specific bottle code designations.

For example, a groundwater monitoring sample collected in support of determining the metal concentration of a target analyte list might be designated as 4GW01501C1, where (from left to right):

- **4** designates the sample as originating from WAG 4
- **GW** designates the sample as being collected in support of the groundwater monitoring
- **015** designates the sequential sample number
- **01** designates the type of sample (01 = original, 02 = field duplicate)
- **C1** designates Contract Laboratory Program (CLP) metal analysis.

A SAP table/database will be used to record all pertinent information associated with each sample ID code.

4.1 Sampling and Analysis Plan Table/Database

4.1.1 Sampling and Analysis Plan Table

A SAP table format was developed to simplify the presentation of the sampling scheme for project personnel. The following sections describe the information recorded in the SAP table/database, which is presented in Appendix A.

4.1.2 Sample Description

The sample description fields contain information relating to individual sample characteristics.

4.1.2.1 Sampling Activity. The sampling activity field contains the first six characters of the assigned sample number. The sample number in its entirety will be used to link information from other sources (e.g., field data and analytical data) to information located in the SAP table for data reporting, sample tracking, and completeness reporting. The analytical laboratory also will use the sample number to track and report analytical results.

4.1.2.2 Sample Type. Data in this field will be selected from the following:

REG	for a regular sample
QC	for a QC sample.

4.1.2.3 Sample Matrix. Data in this field will be selected from the following:

Ground Water	for groundwater samples
Water	for QA/QC water samples
Soil Gas	for soil gas samples
Ambient Air	for QA/QC gas samples

4.1.2.4 Collection Type. Data in this field will be selected from the following:

GRAB	for grab sample collection
RNST	for rinsate QA/QC samples
DUP	for field duplicate samples
FBLK	for field blank QA/QC samples
TBLK	for trip blank QA/QC samples.

4.1.2.5 Planned Date. This date is related to the planned start date of sample collection.

4.1.3 Sample Location Fields

This group of fields pinpoints the exact location for the sample in three-dimensional space, starting with the general AREA, narrowing the focus to an exact location geographically, and then specifying the DEPTH in the depth field.

4.1.3.1 Area. The AREA field identifies the general sample collection area. This field should contain the standard identifier for the INEEL area being sampled. For this investigation, samples are being collected from the CFA site, and the AREA field identifier will correspond to this site.

4.1.3.2 Type of Location. The TYPE OF LOCATION field supplies descriptive information concerning the exact sample location (such as aquifer well or borehole). Information in this field may overlap that in the location field, but it is intended to add detail to the location.

4.1.3.3 Location. The LOCATION field may contain geographical coordinates, x-y coordinates, building numbers, or other location-identifying details, as well as program-specific information (such as borehole or well number). Data in this field normally will be subordinated to the AREA. This information is included on the labels generated by Sample and Analysis Management (formerly the Sample Management Office) to aid sampling personnel.

4.1.3.4 Depth. The DEPTH of a sample location is the distance in feet from surface level or a range in feet from the surface.

4.1.4 Analysis Types

4.1.4.1 AT1–AT20. These fields indicate analysis types (e.g., radiological, chemical, and hydrological). Space is provided at the bottom of the form to clearly identify each type. A standard abbreviation also will be provided, if possible.

5. SAMPLE HANDLING, PACKAGING, AND SHIPPING

After groundwater samples are collected from the well, the sampler with the proper personal protective equipment will wipe the bottles to remove residual water and place them in the proper secured location until shipment. The sample custodian/shipper is responsible for ensuring that clear tape is placed over bottle labels, lids are checked for tightness, parafilm or equivalent (excluding volatile organic analysis samples) is placed around lids, and samples are bagged and properly packaged before shipment.

5.1 Field Screening

Groundwater samples have been collected periodically from INEEL wells for several decades. The laboratory results from all of these samples show that the samples are orders of magnitude below the U.S. Department of Transportation classification of radioactive material. Based on the process knowledge from the previous monitoring results, and the fact that all samples are collected from wells outside the facility fences, neither a field sample radiation screen nor a laboratory shipping screen will be required for these groundwater samples.

5.2 Sample Shipping

Samples will be transported in accordance with the regulations issued by the U.S. Department of Transportation (49 *Code of Federal Regulations* [CFR] 171 through 178). All samples will be packaged and transported to protect the integrity of the sample and prevent sample leakage.

Upon sample receipt (according to their contract), the analytical laboratory personnel will perform the required quality assurance (QA) checks. The laboratory will communicate any discrepancies, such as broken samples or loss of chain-of-custody forms, to the project through the Sample and Analysis Management organization. The project will determine the appropriate corrective action on a case-by-case basis.

6. DOCUMENTATION

The elements of sample documentation covered in this section are described in additional detail in the QAPjP (DOE-ID 2002a). The FTL, or designee, is responsible for controlling and maintaining all field documents and records and for ensuring that all required documents are submitted to the Administrative Record and Document Control coordinator.

The FTL will implement field changes requiring document revision in accordance with the latest revision of MCP-135, "Creating, Modifying, and Canceling Procedures and Other DMCS-Controlled Documents." All entries will be made in permanent, nonsmearable black ink. All errors will be corrected by drawing a single line through the error and by entering the correct information. All corrections will be initialed and dated. However, the nature of sampling activities is such that small variations from the FSP are occasionally required to complete the task. These small deviations in the procedures are a one-time event for which a Document Action Request (Form 412.11) is not necessary or desirable. These variations will be recorded in the WAG 4 groundwater sample logbook.

The serial number or ID number and disposition of all controlled documents (e.g., chain-of-custody forms) will be recorded in the Administrative Record and Document Control Logbook. If a document is lost, a new document will be completed. The loss of a document and an explanation of how the loss was rectified will be recorded in the Document Control Logbook. The serial number and disposition of all damaged or destroyed field documents also will be recorded. All voided and completed documents will be maintained in a project file until completion of the sampling events, at which time all logbooks, unused tags and labels, and chain-of-custody form copies will be submitted to the Sample and Analysis Management organization.

The list of necessary field documents required for sampling and monitoring include the following:

- Chain-of-custody forms
- WAG 4 Groundwater Sample Logbook, which includes shipping data, field instrument calibratiodstandardization, visitors sign-in, and FTL notes and comments
- Quality Assurance Project Plan
- FSP
- HASP

6.1 Field Documentation

6.1.1 Labels

A sample label will be used on each sample. Waterproof, gummed labels will be used. Labels may be affixed to sample containers before going to the field and completed on the actual sample date. The label will contain the sample collection time and date, preservation used, and type of analysis. Labels not in use will remain in the custody of the FTL or the FTL's designee.

6.1.2 Chain-of-Custody Forms

The chain-of-custody record is a multiple-copy form that serves as a written record of sample handling. When a sample changes custody, those relinquishing and receiving the sample will sign a chain-of-custody record. Each change of possession will be documented. Thus, a written record tracking the sample handling will be established.

6.1.3 Logbook

The logbook applicable to this project will be the WAG 4 Groundwater Sample Logbook. The logbook will be used to record information necessary to interpret the analytical data in accordance with INEEL procedures. All information pertaining to sampling activities will be entered into this logbook. Entries will be dated and signed by the individual making the entry. The FTL or designee will check the logbook for accuracy and completeness.

The field team will use a separate sample-shipping logbook. Each sample will be entered in the logbook. This logbook will be used to record the sample ID number, collection date, shipping date, chain-of-custody number, cooler number, destination, sample shipping classification, name of shipper, and signature of person performing the QC check.

Each piece of equipment will be recorded in and will have a record of the standardization data in the WAG 4 Groundwater Sample Logbook. Team members will record information pertaining to the standardization of equipment used during this project.

The FTL will record daily accounting of information related to this sampling project—including problems encountered, deviations from the SAP, and justification for field decisions—in the WAG 4 Groundwater Sample Logbook. This logbook also will double as a visitors guest log.

Small deviations in the procedures that are a one-time event (for which a Document Action Request is not necessary) will be recorded in the WAG 4 Groundwater Sample Logbook, as specified in Section 6.

6.1.4 Field Guidance Forms

The field team may use field guidance forms provided by the Sample and Analysis Management organization to facilitate sample container documentation and to organize field activities. Field guide forms contain information on the laboratory, analysis description, and Task Order Statement of Work analysis type number, minimum sample quantity, preservative requirements, container type, and allowable hold time.

6.1.5 Waste Management Guidance

For each well, the field team will be provided documentation regarding the approximate purge volume and the required waste management options for the purge volume.

6.2 Project Organization and Responsibility

Specific individuals will be assigned the following project positions during performance of the monitoring activities, as needed:

- Safety engineer

- FTL
- Radiological control technician
- Industrial hygienist
- Quality engineers
- Facility manager or representatives
- Sample and Analysis Management point of contact
- Administrative Record and Document Control coordinator
- Radiological engineer
- Occupational Medical Program representative
- Project manager
- Project engineer
- Task lead.

With the exception of the Sample and Analysis Management point of contact and the Administrative Record and Document Control coordinator, the HASP for the Environmental Restoration Sitewide Groundwater Monitoring (INEEL 2003) should be consulted for the overall organizational structure and specific personnel responsibilities. In addition to responsibility descriptions, the HASP ensures the implementation of occupational health and safety requirements.

7. WASTE MINIMIZATION

As part of the prejob briefing, an emphasis will be placed on waste reduction methods, and personnel will be encouraged to continuously attempt to improve methods. No one will use, consume, spend, or expend equipment or materials thoughtlessly or carelessly. Practices to be instituted to support waste minimization include, but are not limited to, the following:

- Restriction of materials (especially hazardous materials) to those needed for performance of work
- Substitution of recyclable or burnable items for disposable items
- Reuse of items, when practical
- Segregation of contaminated from uncontaminated waste
- Segregation of reusable items (such as personal protective equipment and tools).

8. HANDLING AND DISPOSITION OF INVESTIGATION-DERIVED WASTE

All waste dispositioning will be coordinated with the appropriate Waste Generator Services (WGS) interface to ensure compliance with applicable waste storage, characterization, treatment, and disposal requirements.

The investigation-derived waste produced during sampling will include spent and unused sample material, personal protective equipment, miscellaneous sampling supplies, decontamination water, purge water, and samples. The WGS will provide a determination for the disposition of all waste (including purge water) that is based on a waste determination and disposition form.

Before sampling, the FTL will provide the field team with the waste determination and disposition form, which is generated by WGS, for each well. The waste determination and disposition form describes the required disposal option for the purge water. Purge water from a majority of wells to be sampled under this FSP is anticipated to be eligible for release to the ground surface. However, some well purge water and field material for particular wells might need to be containerized and disposed of according to WGS requirements. In addition, to help ensure that the purge volume is correct, the FTL will provide the samplers with the approximate volume of water that was purged from the well during a previous sampling round.

If the purged groundwater must be containerized because of contamination by radionuclides, chemicals, or regulatory restrictions, then containerization will be done as long as a disposal option for the containerized purge water is available. If a purge water disposal option is not available, then WAG 4 will make a reasonable effort to find a disposal option before sampling the well or will reduce generation of this waste. For those sites that have specific purge water disposal restrictions, the groundwater monitoring and sampling team will try to coordinate sampling concurrently with other programs, WAGs, or the USGS to eliminate duplication and to provide for the most efficient and compliant management of purge water by those programs.

9. QUALITY

The objective of this investigation is to provide groundwater sample analytical data of sufficient quality and quantity to adequately monitor the CFA and CFA landfills. This FSP is used in conjunction with the QAPjP (DOE-ID 2002a). These documents present the functional activities, organization, and QA/QC protocols necessary to achieve the specified DQOs. The QAPjP and the FSP together constitute the SAP for Operable Unit 4-12. Project-specific quality requirements, not addressed in the QAPjP or elsewhere in this document, are discussed in this section.

9.1 Quality Control Sampling

As outlined in the QAPjP (DOE-ID 2002a), QA objectives are specified so that the data produced are of a known and sufficient quality for determining whether a risk to human health or the environment exists. Minimum precision, accuracy, and completeness measurements and minimum detection limits are quantitative objectives specified in the QAPjP. Representativeness and comparability are qualitative objectives. During the sampling discussed in this plan, field QC samples—including field blanks, duplicates, and trip blanks—will be collected and analyzed to evaluate the achievement of the precision and accuracy objectives specified in the QAPjP. Overall, both field and laboratory precision will be evaluated through the results of duplicate groundwater samples, equipment rinsates, and field blanks. The duplicate samples, equipment rinsates, and field blanks will be analyzed for the same suite of analytes as the regular groundwater samples. Trip blanks to be analyzed for VOCs will be included in each sample cooler containing VOC sample containers shipped to the laboratory. The QA/QC samples to be collected and the planned analyses are shown in Appendix A.

9.1.1 Performance Evaluation Samples

Environmental analyses are critical because decision-making, based on inaccurate measurements or data of unknown quality, can have significant economic and health consequences. To assess the accuracy and precision of the analytical laboratory, performance evaluation samples will be added, if available, for analysis with other groundwater sample-delivery groups. The performance evaluation samples are spiked with known concentrations of radionuclides or chemicals in levels similar to those expected in the actual samples. Laboratory accuracy and precision will be evaluated based on the analytical results of these performance evaluation samples.

9.2 Quality Assurance Objectives

As outlined in the QAPjP (DOE-ID 2002a), QA objectives are specified to ensure that data produced are of a known and sufficient quality. Minimum precision, accuracy, completeness requirements, and minimum detection limits are quantitative QA objectives specified in this plan or in the QAPjP. Representativeness and comparability are qualitative QA objectives.

9.2.1 Precision

Precision is a measure of the reproducibility of measurements under a given set of conditions. In the field, precision is affected by sample collection procedures and by the natural heterogeneity encountered in the environment. Overall, precision (field and laboratory) can be evaluated by the use of duplicate samples collected in the field. Typically, greater precision is required for analytes with very low action levels that are close to background concentrations.

Laboratory precision will be based on the use of laboratory-generated duplicate samples or matrix spike/matrix spike duplicate samples. Evaluation of laboratory precision will be performed during the method data validation process.

Field precision will be based on the analysis of collected field duplicate or split samples. For samples collected for laboratory analyses, a field duplicate will be collected at a minimum frequency of one in 20 environmental samples.

9.2.2 Accuracy

Accuracy is a measure of bias in a measurement system. Laboratory accuracy is demonstrated using laboratory control samples, blind QC samples, and matrix spikes. Evaluation of laboratory accuracy will be performed during the method data validation process. Sample handling, field contamination, and the sample matrix in the field affect overall accuracy. False positive or high-biased sample results will be assessed by evaluating results from field blanks, trip blanks, and equipment rinsates.

Field accuracy will only be determined for samples collected for laboratory analysis. The field screening instrumentation can only analyze the soil; it is not set up for the analysis of water samples. Therefore, accuracy of field instrumentation will be ensured by using appropriate calibration procedures and standards.

9.2.3 Detection Limits

Detection limits will meet or be less than the risk-based or decision-based concentrations for the contaminants of concern. Detection limits will be as specified in the Sample and Analysis Management (formerly the Sample Management Office) Laboratory Master Task Agreement Statements of Work, Task Order Statements of Work, and as described in the QAPjP (DOE-ID 2002a).

9.2.4 Representativeness

Representativeness is a qualitative parameter that expresses the degree to which the sampling and analysis data accurately and precisely represent the characteristic of a population parameter being measured at a given sampling point or for a process or environmental condition. Representativeness will be evaluated by determining whether measurements are made and physical samples are collected in such a manner that the resulting data appropriately measure the media and phenomenon measured or studied. The comparison of all field and laboratory analytical data sets obtained throughout this remedial action will be used to ensure representativeness.

9.2.5 Comparability

Comparability is a qualitative characteristic that refers to the confidence with which one data set can be compared to another. At a minimum, comparable data must be obtained using unbiased sampling designs. If sampling designs are not unbiased, the reasons for selecting another design should be well documented. Data comparability will be assessed through comparison of all data sets collected during this study for the following parameters:

- Data sets will contain the same variables of interest
- Units will be expressed in common metrics
- Similar analytical procedures and QA will be used to collect data

- Time of variable measurements will be similar
- Measuring devices will have similar detection limits
- Samples within data sets will be selected in a similar manner
- Number of observations will be the same order of magnitude.

9.2.6 Completeness

Completeness is a measure of the quantity of usable data collected during the field sampling activities. The QAPjP (DOE-ID 2002a) requires that an overall completeness goal of 90% be achieved for noncritical samples. If critical parameters or samples are identified, a 100% completeness goal is specified. Critical data points are those sample locations or parameters for which valid data must be obtained in order for the sampling event to be considered complete. Given that this is a monitoring project, all field screening and laboratory data will be considered noncritical with a completeness goal of 90%.

10. DATA VALIDATION, REDUCTION, AND REPORTING

Method data validation is the process whereby analytical data are reviewed against set criteria to ensure that the results conform to the requirements of the analytical method and any other specified requirements. All laboratory-generated analytical data will be validated to Level A in accordance with INEEL procedures. Field-generated data will not be validated. Quality of the field-generated data will be ensured through adherence to established operating procedures and use of equipment calibratiodstandardization, as appropriate.

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Appendix A

Sampling and Analysis Plan Tables

Plan Table Number: WAG4_GW_FY04

SAP Number: INEL/95-0585, REV.4

Date: 10/08/2003 Plan Table Revision: 1.0 Project: WAG 4 OU 4-12 GROUNDWATER MONITORING - NOV. 2003 SAMPLING Project Manager: WAGONER, D. W.

Sampler: Millward, A. L.

SMO Contact: MCGRIFF, T. W.

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
										A1	C1	F3	N2	YB	YD	VL	VM	VA	VE										
4GW015	REG	GROUND WATER	GRAB		11/03/03	CFA	AQUIFER WELL	LF2-08	490	1	1	1	1	1	1	1		1											
4GW016	REG	GROUND WATER	GRAB		11/03/03	CFA	AQUIFER WELL	LF2-09	486	1	1	1	1				1		1										
4GW017	REG	GROUND WATER	GRAB		11/03/03	CFA	AQUIFER WELL	LF2-11	480	1	1	1	1			1		1											
4GW018	REG	GROUND WATER	GRAB		11/03/03	CFA	AQUIFER WELL	LF3-08	503	1	1	1	1	1	1	1		1											
4GW019	REG	GROUND WATER	GRAB		11/03/03	CFA	AQUIFER WELL	LF3-09	500	1	1	1	1			1		1											
4GW020	REG/QC	GROUND WATER	DUP		11/03/03	CFA	AQUIFER WELL	LF3-10	494	2	2	2	2			2		2											
4GW021	REG	GROUND WATER	GRAB		11/03/03	CFA	AQUIFER WELL	CFA-MON-001	512	1	1	1	1	1	1	1		1											
4GW022	REG	GROUND WATER	GRAB		11/03/03	CFA	AQUIFER WELL	CFA-MON-002	512	1	1	1	1	1	1	1		1											
4GW023	REG	GROUND WATER	GRAB		11/03/03	CFA	AQUIFER WELL	CFA-MON-003	494	1	1	1	1	1	1	1		1											
4GW024	REG	GROUND WATER	GRAB		11/03/03	CFA	AQUIFER WELL	USGS-083	500	1	1	1	1			1		1											
4GW025	REG	GROUND WATER	GRAB		11/03/03	CFA	AQUIFER WELL	USGS-128	520	1	1	1	1			1		1											
4GW026	QC	WATER	TBLK		11/03/03	CFA	TRIP BLANK	QC	NA							1		1											
4GW027	QC	WATER	TBLK		11/03/03	CFA	TRIP BLANK	QC	NA							1		1											
4GW028	QC	WATER	FBLK		11/03/03	CFA	FIELD BLANK	QC	NA	1	1	1	1			1		1											
4GW029	QC	WATER	RNST		11/03/03	CFA	EQUIP RINSATE	QC	NA	1	1	1	1			1		1											

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number. The complete sample identification number will appear on the sample labels.

AT1: Alkalinity

AT2: CLP Metals

AT3: Chloride/Fluoride/Sulfate

AT4: Nitrate/Nitrite

AT5: Nitrogen in Nitrate Isotopic Ratio

AT6: Oxygen in Nitrate Isotopic Ratio

AT7: VOCs (CLP TAL)

AT8: VOCs (CLP TAL) - MS/MSD

AT9: VOCs (TAL)

AT10: VOCs (TAL) - MS/MSD

AT11:

AT12:

AT13:

AT14:

AT15:

AT16:

AT17:

AT18:

AT19:

AT20:

Comments:

VOC (CLP TAL) = CLP list plus 2-Chloroethylvinylether, Acetonitrile, Dichlorodifluoromethane (Freon-12), and Trichlorofluoromethane (Freon-11)

VOC (TAL) = methane

Analysis Suites:

Contingencies:

Plan Table Number WAG4_GW_FY04

SAP Number INEL/95-0585, REV.4

Sampler Millward A, L.

Date 10/08/2003 Plan Table Revision: 1 0 Project: WAG 4 OU 4-12 GROUNDWATER MONITORING - NOV 2003 SAMPLING Project Manager: WAGONER, D. W

SMO Contact MCGRIFF, T W.

Sample Description					Planned Date	Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
										AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	A1	C1	F3	N2	YB	YD	VL	VM	VA	VE										
4GW045	REG	GROUND WATER	GRAB		11/03/03	CFA	MONITORING WELL	CFA-1	TBD				1	1	1														
4GW046	REG	GROUND WATER	GRAB		11/03/03	CFA	MONITORING WELL	CFA-2	TBD				1	1	1														

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number. The complete sample identification number will appear on the sample labels.

AT1: Alkalinity

AT2 CLP Metals

AT3 Chloride/Fluoride/Sulfate

AT4 Nitrate/Nitrite

AT5 Nitrogen in Nitrate Isotopic Ratio

AT6 Oxygen in Nitrate Isotopic Ratio

AT7 VOCs (U P TALI

AT8 VOCs (CLPTAL) MS/MSD

AT9 VOCs (TAL)

AT10 VOCS (TAL) - MS/MSD

AT11

AT12

AT13

ATII

AT15

AT16

ATII

AT18

AT19

AT20

Comments:

VOC (CLPTAL) = CLP list plus 2-Chloroethylvinylether, Acetonitrile, Dichlorodifluoromethane (Freon-12) and Trichlorofluoromethane (Freon-11)

VOC (TAL) = methane

Analysis Suites

Contingencies

?4

Plan Table Number WAG4_GW_FY05

SAP Number INEL/95-0585, R N 4

Sampler: Millward, A L

Date: 09/23/2003 Plan Table Revision 0.0 Project: WAG 4 OU 4-12 GROUNDWATER MONITORING FOR FY 2005 Project Manager WAGONER, D W

SMO Contact: KIRCHNER, D R

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
										A1	C1	F3	N2	VL	VM	VA	VE												
4GW200	REG	GROUND WATER	GRAB		10/01/2004	CFA	AQUIFER WELL	LF2 08	490	1	1	1	1	1		1													
4GW201	REG	GROUNDWATER	GRAB		10/01/2004	CFA	AQUIFER WELL	LF2-09	486	1	1	1	1	1		1													
4GW202	REG	GROUNDWATER	GRAB		10/01/2004	CFA	AOUIFER WELL	LF2 11	480	1	1	1	1		1		1												
4GW203	REG	GROUNDWATER	GRAB		10/01/2004	CFA	AQUIFER WELL	LF3 08	503	1	1	1	1	1		1													
4GW204	REG	GROUNDWATER	GRAB		10/01/2004	CFA	AQUIFER WELL	LF3-09	500	1	1	1	1	1		1													
4GW205	REG/QC	GROUNDWATER	DUP		10/01/2004	CFA	AOUIFER WELL	LF3-10	494	2	2	2	2	2		2													
4GW206	REG	GROUND WATER	GRAB		10/01/2004	CFA	AOUIFER WELL	CFA MON-001	512	1	1	1	1	1		1													
4GW207	REG	GROUNDWATER	GRAB		1010112004	CFA	AQUIFER WELL	CFA MON-002	512	1	1	1	1	1		1													
4GW208	REG	GROUND WATER	GRAB		10/01/2004	CFA	AQUIFER WELL	CFA MON-003	494	1	1	1	1	1		1													
4GW209	REG	GROUNDWATER	GRAB		10/01/2004	CFA	AOUIFER WELL	USGS 083	500	1	1	1	1	1		1													
4GW210	REG	GROUNDWATER	GRAB		1010112004	CFA	AQUIFER WELL	USGS-128	520	1	1	1	1	1		1													
4GW211	QC	WATER	TBLK		10/01/2004	CFA	TRIP BLANK	QC	NA					1		1													
4GW212	QC	WATER	TBLK		10/01/2004	CFA	TRIP BLANK	QC	NA					1		1													
4GW213	QC	WATER	FBLK		10/01/2004	CFA	FIELD BLANK	QC	NA	1	1	1	1	1		1													
4GW214	QC	WATER	RNST		10/01/2004	CFA	EQUIP RINSATE	QC	NA	1	1	1	1	1		1													

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number The complete sample identification number will appear on the sample labels

AT1 Alkalinity
AT2: CLP Metals
AT3 Chloride/Fluoride/Sulfate
AT4 Nitrate/Nitrite
AT5 VOCs (CLP TAL)
AT6 VOCs (CLP TAL) - MS/MSD
AT7 VOCs (TAL)
AT8: VOCs (TAL) - MS/MSD
AT9
AT10

AT11:
AT12
AT13:
AT14
AT15:
AT16:
AT17:
AT18:
AT19
AT20

Comments:
VOC (CLP TAL) = CLP list plus 2-Chloroethylvinylether, Acetonitrile, Dichlorodifluoromethane (Freon-12), and Trichlorofluoromethane (Freon-11)

VOC (TAL) = methane

Analysis Suites:

Contingencies.

Plan Table Number WAG4_GW_FY06

SAP Number INEL/95 0585 **RV** 4

Sampler Millward A L

Date *0912312003* Plan **Table Revision** 0 0 Project WAG 4 OU 4-12 GROUNDWATERMONITORING FOR FY 2006 Project Manager: **WAGONER** D W **SMO Contact:** KIRCHNER D R

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
										A1	C1	F3	N2	VL	VM	VA	VE												
4GW030	REG	GROUND WATER	GRAB		10/01/2005	CFA	AQUIFER WELL	LF2-08	490	1	1	1	1	1		1													
4GW031	REG	GROUND WATER	GRAB		10/01/2005	CFA	AQUIFER WELL	LF2-09	486	1	1	1	1	1		1													
4GW032	REG	GROUND WATER	GRAB		10/01/2005	CFA	AQUIFER WELL	LF2-11	480	1	1	1	1	1		1													
4GW033	REG	GROUND WATER	GRAB		10/01/2005	CFA	AQUIFER WELL	LF3-08	503	1	1	1	1	1		1													
4GW034	REG	GROUND WATER	GRAB		10/01/2005	CFA	AQUIFER WELL	LF3-09	500	1	1	1	1	1		1													
4GW035	REG/QC	GROUND WATER	DUP		10/01/2005	CFA	AQUIFER WELL	LF3-10	494	2	2	2	2	2		2													
4GW036	REG	GROUND WATER	GRAB		10/01/2005	CFA	AQUIFER WELL	CFA-MON-001	512	1	1	1	1	1		1													
4GW037	REG	GROUND WATER	GRAB		10/01/2005	CFA	AQUIFER WELL	CFA-MON-002	512	1	1	1	1	1			1												
4GW038	REG	GROUND WATER	GRAB		10/01/2005	CFA	AQUIFER WELL	CFA-MON-003	494	1	1	1	1		1	1													
4GW039	REG	GROUND WATER	GRAB		10/01/2005	CFA	AQUIFER WELL	USGS-083	500	1	1	1	1	1		1													
4GW040	REG	GROUND WATER	GRAB		10/01/2005	CFA	AQUIFER WELL	USGS-128	520	1	1	1	1	1		1													
4GW041	QC	WATER	TBLK		10/01/2005	CFA	TRIP BLANK	QC	NA					1		1													
4GW042	QC	WATER	TBLK		10/01/2005	CFA	TRIP BLANK	QC	NA					1		1													
4GW043	QC	WATER	FBLK		10/01/2005	CFA	FIELD BLANK	QC	NA	1	1	1	1	1		1													
4GW044	QC	WATER	RNST		10/01/2005	CFA	EQUIP RINSATE	QC	NA	1	1	1	1	1		1													

The sampling activity displayed on this table represents me first 6 to 9 characters of the sample identification number

The complete sample identification number will appear on the sample labels

AT1 Alkalinity

AT2 CLP Metals

AT3 Chloride/Fluoride/Sulfate

AT4 Nitrate/Nitrite

AT5 VOCS ICLPTAL)

AT6 VOCs (CLP TAL) MS/MSD

AT7 VOCs (TAL)

AT8: VOCS (TAL) - MS/MSD

AT9:

AT10

AT11

AT12

AT13

AT14

AT15

AT16

AT17

AT18:

AT19

AT20

Comments

VOC (CLP TAL) = CLP list plus 2 Chloroethylvinylether Acetonitrile Dichlorodifuloromethane Ifreon-14 and Trichlorofluoromethane (Freon 11)

~~VOC (TAL) = methane~~

Analysis suites

Contingencies

Plan Table Number WAG4_GW_FY07

SAP Number INEL/95 0585 R N 4

Sampler Millward A L

Date 09/23/2003 Plan Table Revision 0 0 Project: WAG 4 OU 6 1 2 GROUNDWATER MONITORING FOR FY 2007 Project Manager WAGONER D W SMO Contact: KIRCHNER D R

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
										A1	C1	F3	N2	VL	VM	VA	VE												
4GW050	REG	GROUND WATER	GRAB		10/01/2006	CFA	AQUIFER WELL	LF2-08	490	1	1	1	1	1		1													
4GW051	REG	GROUND WATER	GRAB		10/01/2006	CFA	AQUIFER WELL	LF2-09	486	1	1	1	1	1		1													
4GW052	REG	GROUND WATER	GRAB		10/01/2006	CFA	AQUIFER WELL	LF2-11	480	1	1	1	1	1		1													
4GW053	REG	GROUND WATER	GRAB		10/01/2006	CFA	AQUIFER WELL	LF3-08	503	1	1	1	1	1		1													
4GW054	REG	GROUND WATER	GRAB		10/01/2006	CFA	AQUIFER WELL	LF3-09	500	1	1	1	1	1		1													
4GW055	REG/QC	GROUND WATER	DUP		10/01/2006	CFA	AQUIFER WELL	LF3-10	494	2	2	2	2	2		2													
4GW056	REG	GROUND WATER	GRAB		10/01/2006	CFA	AQUIFER WELL	CFA-MON-001	512	1	1	1	1		1	1													
4GW057	REG	GROUND WATER	GRAB		10/01/2006	CFA	AQUIFER WELL	CFA-MON-002	512	1	1	1	1	1			1												
4GW058	REG	GROUND WATER	GRAB		10/01/2006	CFA	AQUIFER WELL	CFA-MON-003	494	1	1	1	1	1		1													
4GW059	REG	GROUND WATER	GRAB		10/01/2006	CFA	AQUIFER WELL	USGS-083	500	1	1	1	1	1		1													
4GW060	REG	GROUND WATER	GRAB		10/01/2006	CFA	AQUIFER WELL	USGS-128	520	1	1	1	1	1		1													
4GW061	QC	WATER	TBLK		10/01/2006	CFA	TRIP BLANK	QC	NA					1		1													
4GW062	QC	WATER	TBLK		10/01/2006	CFA	TRIP BLANK	QC	NA					1		1													
4GW063	QC	WATER	FBLK		10/01/2006	CFA	FIELD BLANK	QC	NA	1	1	1	1	1		1													
4GW064	QC	WATER	RNST		10/01/2006	CFA	EQUIP RINSATE	QC	NA	1	1	1	1	1		1													

The sampling activity displayed on this table represents the first 6 to 9 characters of the Sample identification number. The complete sample identification number will appear on the sample labels

AT1: Alkalinity

AT2 CLP Metals

AT3 Chloride/Fluoride/Sulfate

AT4: Nitrate/Nitrite

AT5: VOCs (CLP TAL)

AT6 VOCs (CLP TAL) - MS/MSD

AT7 VOCs (TAL)

AT8 VOCs (TAL) - MS/MSD

AT9

AT10

AT11:

AT12:

AT13:

AT14:

AT15:

AT16

AT17:

AT18:

AT19

AT20

Comments

VOC (CLPTAL) = CLP list plus 2-Chloroethylvinylether, Acetonitrile, Dichlorodifluoromethane (Freon-12), and Trichlorofluoromethane (Freon-21)

VOC (TAL) = methane

Analysis Suites

Contingencies

Plan Table Number. WAG4_GW_FY08

SAP Number !NEL/95-0585. REV.4

Date: 09/23/2003 Plan Table Revision 0 0 Project WAG 4 OU 4-12 GROUNDWATERMONITORING FOR FY 2008 ProjectManager WAGONER, D W.

Sampler: Miilward, A. L.

SMO Contact KIRCHNER. D. R

Sample Description					Planned Date	Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method		Area	Type of Location	Location	Depth (ft)	AT1 A1	AT2 C1	AT3 F3	AT4 N2	AT5 VL	AT6 VM	AT7 VA	AT8 VE	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
4GW250	REG	GROUND WATER	GRAB		10/01/2007	CFA	AQUIFER WELL	LF2-08	490	1	1	1	1		1	1													
4GW251	REG	GROUND WATER	GRAB		10/01/2007	CFA	AQUIFER WELL	LF2-09	486	1	1	1	1	1		1													
4GW252	REG	GROUND WATER	GRAB		10/01/2007	CFA	AQUIFER WELL	LF2-11	480	1	1	1	1	1		1													
4GW253	REG	GROUND WATER	GRAB		10/01/2007	CFA	AQUIFER WELL	LF3-08	503	1	1	1	1	1		1													
4GW254	REG	GROUND WATER	GRAB		10/01/2007	CFA	AQUIFER WELL	LF3-09	500	1	1	1	1	1		1													
4GW255	REG/QC	GROUND WATER	DUP		10/01/2007	CFA	AQUIFER WELL	LF3-10	494	2	2	2	2	2		2													
4GW256	REG	GROUND WATER	GRAB		10/01/2007	CFA	AQUIFER WELL	CFA-MON-001	512	1	1	1	1	1		1													
4GW257	REG	GROUND WATER	GRAB		10/01/2007	CFA	AQUIFER WELL	CFA-MON-002	512	1	1	1	1	1			1												
4GW258	REG	GROUND WATER	GRAB		10/01/2007	CFA	AQUIFER WELL	CFA-MON-003	494	1	1	1	1	1		1													
4GW259	REG	GROUND WATER	GRAB		10/01/2007	CFA	AQUIFER WELL	USGS-083	500	1	1	1	1	1		1													
4GW260	REG	GROUNDWATER	GRAB		10/01/2007	CFA	AQUIFER WELL	USGS-128	520	1	1	1	1	1		1													
4GW261	QC	WAER	TBLK		10/01/2007	CFA	TRIP BLANK	QC	NA					1		1													
4GW262	QC	WATER	TBLK		10/01/2007	CFA	TRIP BLANK	QC	NA					1		1													
4GW263	QC	WATER	FBLK		10/01/2007	CFA	FIELDBLANK	QC	NA	1	1	1	1	1		1													
4GW264	OC	WATER	RNST		1010112007	CFA	EQUIP RINSATE	QC	NA	1	1	1	1	1		1													

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number. The complete sample identification number will appear on the sample labels.

AT1: Alkalinity
AT2 CLP Metals
AT1 Chloride/Fluoride/Sulfate
AT4 Nitrate/Nitrite
AT5: VOCs (CLP TAL]
AT6: VOCs (CL? TAL) - MSNSD
AT7 VOCs (TAL)
AT8: VOCS (TAL)- MS/MSD
AT9:
AT10:

AT11:
AT12:
AT13
AT14:
AT15
AT16:
AT17:
AT18
AT19:
AT20:

Comments-
VOC (CLP TAL) = CLP list plus 2-Chloroethylvinylether, Acetonitrile, Dichlorodifluoromethane (Freon-12), and Trichlorofluoromethane (Freon-11)

VOC (TAL) = methane

Analysis Suites

Contingencies:

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8

Sample Description					Planned	Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
Sampling Activity	Sample Type	Sample Matrix	Coli Type	Sampling Method	Oale	Area	Type of Localion	Location	Depth	AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
										3A																			
4SG000	REG	SOILGAS	GRAB		0910112003	CFA	BOREHOLE	GSP1-1	125	1																			
4SG001	REG	SOILGAS	GRAB		0910112003	CFA	BOREHOLE	GSP1-1	37 **5**	1																			
4SG002	REG	SOILGAS	GRAB		0910112003	CFA	BOREHOLE	GSPI-1	77 **5**	1																			
4SG003	REG	SOILGAS	GRAB		0910112003	CFA	BOREHOLE	GSP1-1	107.5	1																			
4SG004	REG/QC	SOILGAS	DU?		0910112003	CFA	BOREHOLE	GSP2-1	125	2																			
4SG005	REG	SOILGAS	GRAB		09/01/2003	CFA	BOREHOLE	GSP2-1	37.5	1																			
4SG006	REG	SOILGAS	GRAB		0910112003	CFA	BOREHOLE	GSP2-1	77 5	1																			
4SG007	REG	SOILGAS	GRAB		0910112003	CFA	BOREHOLE	GSP2-1	1075	1																			
4SG008	REG	SOILGAS	GRAB		09/01/2003	CFA	BOREHOLE	GSP2-2	125	1																			
4SG009	REG	SOILGAS	GRAB		0910112003	CFA	BOREHOLE	GSP2-2	37 5	1																			
4SG010	REG	SOILGAS	GRAB		09/01/2003	CFA	BOREHOLE	GSP2-2	77.5	1																			
4SG011	REG	SOILGAS	GRAB		0910112003	CFA	BOREHOLE	GSP2-2	107.5	1																			
4SG012	REG	SOILGAS	GRAB		0910112003	CFA	BOREHOLE	GSP3-1	125	1																			
4SG013	REG	SOILGAS	GRAB		09/01/2003	CFA	BOREHOLE	GSP3-1	37 5	1																			
4SG014	REG	SOILGAS	GRAB		0910112003	CFA	BOREHOLE	GSP3-1	77 **5**	1																			

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number

The complete sample identification number will appear on the sampie labels

AT1: Analysis Suite #1

AT2

AT3

AT4:

A15

AT6

AT7:

AT8:

AT9

AT10:

AT11:

AT12

AT13

AT14

AT15

AT16

AT17

AT18:

AT19

AT20:

Comments

Analysis Suites

Contingencies

Analysis Suite #1 Methane, VOCs (TO-14)

Plan Table Number WG4SOILGAS-FY03

SAP Number

Sampler Millward, A L

Dale 09/23/2003 Plan Table Revision 0 0 Project WAG 4 - CFA LANDFILLS- SEPTEMBER 2003 Project Manager WAGONER, D W SMO Contact: KIRCHNER, D R

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
										AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	3A																			
4SG015	REG	SOIL GAS	GRAB		09/01/2003	CFA	BOREHOLE	GSP3-1	107.5	1																			
4SG016	REG	SOIL GAS	GRAB		09/01/2003	CFA	BOREHOLE	GSP3-2	12.5	1																			
4SG017	REG	SOIL GAS	GRAB		09/01/2003	CFA	BOREHOLE	GSP3-2	37.5	1																			
4SG018	REG	SOIL GAS	GRAB		09/01/2003	CFA	BOREHOLE	GSP3-2	77.5	1																			
4SG019	REG	SOIL GAS	GRAB		09/01/2003	CFA	BOREHOLE	GSP3-2	107.5	1																			
4SG020	QC	AMBIENT AIR	FBLK		09/01/2003	CFA	FIELD BLANK	QC	NA	1																			

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number. The completesampleidentification number will appearon Me samplelabels

AT1: Analysis Suite #1

AT2:

AT3

AT4

AT5

AT6

AT7:

AT8

AT9

AT10:

AT11:

AT12

AT13

AT14

AT15

AT16

AT17

AT18:

AT19

AT20

Comments,

Analysis Suites

Analysis Suite #1 Methane, VOCs [TO-14)

Contingencies.

Plan Table Number WG4SOILGAS-FY04

SAP Number

Sampler, Millward A L

Date: 0912312003 Pian Table Revision. 0 0 Project WAG 4 - CFA LANDFILLS .SEPTEMBER 2004 ProjectManager WAGONER, D W SMO Contact KIRCHNER, D R

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
										3A																			
4SG050	REG	SOIL GAS	GRAB		09/01/2004	CFA	BOREHOLE	GSP1-1	12.5	1																			
4SG051	REG	SOIL GAS	GRAB		09/01/2004	CFA	BOREHOLE	GSP1-1	37.5	1																			
4SG052	REG	SOIL GAS	GRAB		09/01/2004	CFA	BOREHOLE	GSP1-1	77.5	1																			
4SG053	REG	SOIL GAS	GRAB		09/01/2004	CFA	BOREHOLE	GSP1-1	107.5	1																			
4SG054	REG/QC	SOIL GAS	DUP		09/01/2004	CFA	BOREHOLE	GSP2-1	12.5	2																			
4SG055	REG	SOIL GAS	GRAB		09/01/2004	CFA	BOREHOLE	GSP2-1	37.5	1																			
4SG056	REG	SOIL GAS	GRAB		09/01/2004	CFA	BOREHOLE	GSP2-1	77.5	1																			
4SG057	REG	SOIL GAS	GRAB		09/01/2004	CFA	BOREHOLE	GSP2-1	107.5	1																			
4SG058	REG	SOIL GAS	GRAB		09/01/2004	CFA	BOREHOLE	GSP2-2	12.5	1																			
4SG059	REG	SOIL GAS	GRAB		09/01/2004	CFA	BOREHOLE	GSP2-2	37.5	1																			
4SG060	REG	SOIL GAS	GRAB		09/01/2004	CFA	BOREHOLE	GSP2-2	77.5	1																			
4SG061	REG	SOIL GAS	GRAB		09/01/2004	CFA	BOREHOLE	GSP2-2	107.5	1																			
4SG062	REG	SOIL GAS	GRAB		09/01/2004	CFA	BOREHOLE	GSP3-1	12.5	1																			
4SG063	REG	SOIL GAS	GRAB		09/01/2004	CFA	BOREHOLE	GSP3-1	37.5	1																			
4SG064	REG	SOIL GAS	GRAB		09/01/2004	CFA	BOREHOLE	GSP3-1	77.5	1																			

The sampling activity displayed on this table represents the **first** 6 to 9 characters of the Sample identification number. The complete sample identification **number** will appear on h e sample **labels.**

AT1: Analysis Suite #1

AT2

AT3

AT4.

AT5

AT6

AT7

AT8

AT9:

AT10:

AT11

AT12

AT13:

AT14

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AT17:

AT18

AT19:

AT20

Comments.

Analysis Suites

Analysis Suite #1 Methane. VOCs (TO-14)

Contingencies

Plan Table Number: WG4SOILGAS-FY04

SAP Number:

Sampler: Millward, A. L.

Date: 09/23/2003 Plan Table Revision: 0.0 Project: WAG 4 - CFA LANDFILLS - SEPTEMBER 2004 Project Manager: WAGONER, D. W. SMO Contact: KIRCHNER, D. R.

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
										3A																			
4SG065	REG	SOIL GAS	GRAB		09/01/2004	CFA	BOREHOLE	GSP3-1	107.5	1																			
4SG066	REG	SOIL GAS	GRAB		09/01/2004	CFA	BOREHOLE	GSP3-2	12.5	1																			
4SG067	REG	SOIL GAS	GRAB		09/01/2004	CFA	BOREHOLE	GSP3-2	37.5	1																			
4SG068	REG	SOIL GAS	GRAB		09/01/2004	CFA	BOREHOLE	GSP3-2	77.5	1																			
4SG069	REG	SOIL GAS	GRAB		09/01/2004	CFA	BOREHOLE	GSP3-2	107.5	1																			
4SG070	QC	AMBIENT AIR	FBLK		09/01/2004	CFA	FIELD BLANK	QC	NA	1																			

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number. The complete sample identification number will appear on the sample labels.

AT1: Analysis Suite #1
AT2:
AT3:
AT4:
AT5:
AT6:
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AT17:
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AT19:
AT20:

Comments:

Analysis Suites:

Contingencies:

Analysis Suite #1: Methane, VOCs (TO-14)

Samplingand Analysis Plan Table for Chemical and Radiological Analysis 09123120031041AM

Plan Table Number. WG4SOILGAS-FY05

SAP Number Sampler. Millward, A L

Date 0912312003 Plan Table Revision: 0 0 Project: WAG 4 - CFA LANDFILLS. SEPTEMBER 2005 Project Manager WAGONER, O W SMO Contact: KIRCHNER.O R

Sample Description					Planned Dale	Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
Sampling Activity	Sample Type	Sample Matrix	Coli Type	Sampling Method		Area	Type of Location	Location	Depth (ft)	AT1 3A	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
4SG100	REG	SOILGAS	GRAB		0910112005	CFA	BOREHOLE	GSP1-1	125	1																			
4SG101	REG	SOILGAS	GRAB		0910112005	CFA	BOREHOLE	GSP1-1	37 5	1																			
4SG102	REG	SOILGAS	GRAB		0510112005	CFA	BOREHOLE	GSP1-1	77 5	1																			
4SG103	REG	SOILGAS	GRAB		0910112005	CFA	BOREHOLE	GSP1-1	107 5	1																			
4SG104	REG/QC	SOILGAS	DUP		0510112005	CFA	BOREHOLE	GSP2-1	125	2																			
4SG105	REG	SOIL GAS	GRAB		0510112005	CFA	BOREHOLE	GSP2-1	37 5	1																			
4SG106	REG	SOILGAS	GRAB		09/01/2005	CFA	BOREHOLE	GSP2-1	77 5	1																			
4SG107	REG	SOILGAS	GRAB		0910112005	CFA	BOREHOLE	GSP2-1	107 5	1																			
4SG108	REG	SOILGAS	GRAB		0910112005	CFA	BOREHOLE	GSP2-2	125	1																			
4SG109	REG	SOILGAS	GRAB		0910112005	CFA	BOREHOLE	GSP2-2	37.5	1																			
456110	REG	SOILGAS	GRAB		09/01/2005	CFA	BOREHOLE	GSP2-2	77 5	1																			
4SG111	REG	SOILGAS	GRAB		0910112005	CFA	BOREHOLE	GSP2-2	107 5	1																			
4SG112	REG	SOIL GAS	GRAB		0910112005	CFA	BOREHOLE	GSP3-1	125	1																			
4SG113	REG	SOILGAS	GRAB		0510112005	CFA	BOREHOLE	GSP3-1	37 5	1																			
4SG114	REG	SOILGAS	GRAB		0910112005	CFA	BOREHOLE	GSP3-1	77 5	1																			

The samplingactivity displayed on this table represents the first 6 to 9 characters of the sample identification number. The complete sample identification number will appear on the sample labels

AT1: Analysis Suite #1
AT2:
AT3
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AT10

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AT13:
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AT17:
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AT19
AT20

Comments

Analysis Suites

Analysis Suite #1: Methane, VOCs (TO-14)

Contingencies

Plan Table Number: WG4SOILGAS-FY05

SAP Number:

Sampler: Millward, A. L.

Date: 09/23/2003 Plan Table Revision: 0.0 Project: WAG 4 - CFA LANDFILLS - SEPTEMBER 2005 Project Manager: WAGONER, D. W. SMO Contact: KIRCHNER, D. R.

Sample Description					Planned Date	Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method		Area	Type of Location	Location	Depth (ft)	AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
										3A																			
4SG115	REG	SOIL GAS	GRAB		09/01/2005	CFA	BOREHOLE	GSP3-1	107.5	1																			
4SG116	REG	SOIL GAS	GRAB		09/01/2005	CFA	BOREHOLE	GSP3-2	12.5	1																			
4SG117	REG	SOIL GAS	GRAB		09/01/2005	CFA	BOREHOLE	GSP3-2	37.5	1																			
4SG118	REG	SOIL GAS	GRAB		09/01/2005	CFA	BOREHOLE	GSP3-2	77.5	1																			
4SG119	REG	SOIL GAS	GRAB		09/01/2005	CFA	BOREHOLE	GSP3-2	107.5	1																			
4SG120	QC	AMBIENT AIR	FBLK		09/01/2005	CFA	FIELD BLANK	QC	NA	1																			

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number

The complete sample identification number will appear on the sample labels

AT1: Analysis Suite #1

AT2:

AT3:

AT4:

AT5:

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AT7:

AT8:

AT9:

AT10:

AT11:

AT12:

AT13:

AT14:

AT15:

AT16:

AT17

AT18:

AT19

AT20

Comments:

Analysis Suites:

Contingencies:

Analysis Suite #1: Methane, VOCs (TO-14)

Sample Description					Planned Dale	Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
										AT1	AT2	AT3	AT4	AT5	AT5	AT7	AT8	AT9	AT10	ATII	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
Sampling Activity	Sample Type	Sample Matrix	Call Type	Sampling Method		Area	Type of Location	Location	Depth (ft)	3A																			
4SG150	REG	SOILGAS	GRAB		0910112006	CFA	BOREHOLE	GSP1-1	125	1																			
4SG151	REG	SOILGAS	GRAB		0910112006	CFA	BOREHOLE	GSP1-1	37 5	1																			
4SG152	REG	SOILGAS	GRAB		0910112006	CFA	BOREHOLE	GSP1-1	775	1																			
4SG153	REG	SOILGAS	GRAB		09/01/2006	CFA	BOREHOLE	GSP1-1	1075	1																			
4SG154	REGIOC	SOILGAS	DUP		09/01/2006	CFA	BOREHOLE	GSP2-1	12.5	2																			
4SG155	REG	SOILGAS	GRAB		09/01/2006	CFA	BOREHOLE	GSP2-1	37.5	1																			
4SG156	REG	SOILGAS	GRAB		0910112006	CFA	BOREHOLE	GSP2-1	77 5	1																			
4SG157	REG	SOILGAS	GRAB		09/01/2006	CFA	BOREHOLE	GSP2-1	1075	1																			
4SG158	REG	SOILGAS	GRAB		09/01/2006	CFA	BOREHOLE	GSP2-2	12.5	1																			
4SG159	REG	SOILGAS	GRAB		09/01/2006	CFA	BOREHOLE	GSP2-2	37 5	1																			
4SG160	REG	SOILGAS	GRAB		0910112006	CFA	BOREHOLE	GSP2-2	77 5	1																			
4SG161	REG	SOILGAS	GRAB		09/01/2006	CFA	BOREHOLE	GSP2-2	1075	1																			
4SG162	REG	SOILGAS	GRAB		09/01/2006	CFA	BOREHOLE	GSP3-1	125	1																			
4SG163	REG	SOILGAS	GRAB		09/01/2006	CFA	BOREHOLE	GSP3-1	37 5	1																			
4SG164	REG	SOIL GAS	GRAB		09/01/2006	CFA	BOREHOLE	GSP3-1	77.5	1																			

The sampling activity displayed an this table represents the first 6 to 9 characters of the sample identification number

The complete sample identification number will appear on the sample labels

AT1 Analysis Suite #1

AT2:

AT3

AT4

AT5

AT6:

AT7.

AT6

AT9

AT10:

ATII'

AT12:

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AT20

Comments

Analysis Suites:

Conangencies

Analysis Suite #1: Methane VOCs (TO-14)

Sampling and Analysis Plan Table for Chemical and Radiological Analysis

Plan Table Number: WG4SOILGAS-FY06

SAP Number:

Sampler: Millward, A. L.

Date: 09/23/2003 Plan Table Revision: 0.0 Project: WAG 4 - CFA LANDFILLS - SEPTEMBER 2006 Project Manager: WAGONER, D. W. SMO Contact: KIRCHNER, D. R.

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
										3A																			
4SG165	REG	SOIL GAS	GRAB		09/01/2006	CFA	BOREHOLE	GSP3-1	107.5	1																			
4SG166	REG	SOIL GAS	GRAB		09/01/2006	CFA	BOREHOLE	GSP3-2	12.5	1																			
4SG167	REG	SOIL GAS	GRAB		09/01/2006	CFA	BOREHOLE	GSP3-2	37.5	1																			
4SG168	REG	SOIL GAS	GRAB		09/01/2006	CFA	BOREHOLE	GSP3-2	77.5	1																			
4SG169	REG	SOIL GAS	GRAB		09/01/2006	CFA	BOREHOLE	GSP3-2	107.5	1																			
4SG170	QC	AMBIENT AIR	FBLK		09/01/2006	CFA	FIELD BLANK	QC	NA	1																			

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number. The complete sample identification number will appear on the sample labels.

AT1: Analysis Suite #1
AT2:
AT3:
AT4:
AT5:
AT6:
AT7:
AT8:
AT9:
AT10:

AT11:
AT12:
AT13:
AT14:
AT15:
AT16:
AT17:
AT18:
AT19:
AT20:

Comments:

Analysis Suites:

Analysis Suite #1: Methane, VOCs (TO-14)

Contingencies:

Plan Table Number. WG4SOILGAS-FY07

SAP Number

Sampler Millward, A L.

Date 09/23/2003 Plan Table Revision: 0 0 Project: WAG 4 - CFA LANDFILLS - SEPTEMBER 2007 Project Manager WAGONER, D W SMO Contact KIRCHNER D R

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
										AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
Sampling Activity	Sample Type	Sample Matrix	Coli Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	3A																			
4SG200	REG	SGILGAS	GRAB		0910112007	CFA	BOREHOLE	GSP1-1	12.5	1																			
4SG201	REG	SOILGAS	GRAB		0910112007	CFA	BOREHOLE	GSP1-1	37 5	1																			
4SG202	REG	SOILGAS	GRAB		0910112007	CFA	BOREHOLE	GSP1-1	77.5	1																			
4SG203	REG	SGILGAS	GRAB		0910112007	CFA	BGREHOLE	GSP1-1	107 5	1																			
4SG204	REG/QC	SGILGAS	DUP		0910112007	CFA	BOREHOLE	GSP2-1	125	2																			
4SG205	REG	SGILGAS	GRAB		0910112007	CFA	BOREHOLE	GSP2-1	37 5	1																			
4SG206	REG	SOIL GAS	GRAB		09/01/2007	CFA	BOREHOLE	GSP2-1	77 5	1																			
4SG207	REG	SGILGAS	GRAB		0910112007	CFA	BOREHOLE	GSP2-1	107 5	1																			
4SG208	REG	SGILGAS	GRAB		0910112001	CFA	BOREHOLE	GSP2-2	12.5	1																			
4SG209	REG	SOILGAS	GRAB		0910112007	CFA	BOREHOLE	GSP2-2	37 5	1																			
4SG210	REG	SOILGAS	GRAB		0910112007	CFA	BOREHOLE	GSP2-2	77 5	1																			
4SG211	REG	SGILGAS	GRAB		0910112007	CFA	BOREHOLE	GSP2-2	107 5	1																			
4SG212	REG	SOILGAS	GRAB		090112007	CFA	BOREHOLE	GSP3-1	12.5	1																			
4SG213	REG	SOILGAS	GRAB		0910112007	CFA	BOREHOLE	GSP3-1	37 5	1																			
4SG214	REG	SGILGAS	GRAB		0910112007	CFA	BOREHOLE	GSP3-1	77 5	1																			

The samplingac ivity displayed on this table represents the first 6 to 9 characters of the sample identification number The complete sample identification number will appear on the sample labels.

AT1 Analysis Suite #1

AT2

AT3

AT4

AT5.

AT6

AT7

AT8

AT9:

AT10

AT11:

AT12

AT13

AT14

AT15:

AT16

AT17

AT18

AT19

AT20

Comments

Analysis Suites

Anaiysis Suite #1 Methane, VOCs (TO-14)

Contingencies

Plan Table Number: WG4SOILGAS-FY07

SAP Number:

Sampler: Millward, A. L.

Date: 09/23/2003 Plan Table Revision: 0.0 Project: WAG 4 - CFA LANDFILLS - SEPTEMBER 2007 Project Manager: WAGONER, D. W. SMO Contact: KIRCHNER, D. R.

Sample Description						Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
										AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method	Planned Date	Area	Type of Location	Location	Depth (ft)	3A																			
4SG215	REG	SOIL GAS	GRAB		09/01/2007	CFA	BOREHOLE	GSP3-1	107.5	1																			
4SG216	REG	SOIL GAS	GRAB		09/01/2007	CFA	BOREHOLE	GSP3-2	12.5	1																			
4SG217	REG	SOIL GAS	GRAB		09/01/2007	CFA	BOREHOLE	GSP3-2	37.5	1																			
4SG218	REG	SOIL GAS	GRAB		09/01/2007	CFA	BOREHOLE	GSP3-2	77.5	1																			
4SG219	REG	SOIL GAS	GRAB		09/01/2007	CFA	BOREHOLE	GSP3-2	107.5	1																			
4SG220	QC	AMBIENT AIR	FBLK		09/01/2007	CFA	FIELD BLANK	QC	NA	1																			

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number

The complete sample identification number will appear on the sample labels

AT1: Analysis Suite #1

AT2:

AT3:

AT4:

AT5:

AT6:

AT7:

AT8:

AT9:

AT10:

AT11:

AT12:

AT13:

AT14:

AT15:

AT16:

AT17:

AT18:

AT19:

AT20:

Comments:

Analysis Suites:

Contingencies:

Analysis Suite #1: Methane, VOCs (TO-14)